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WHAT ROME WAS BUILT WITH

'I found it of brick but left it of marble'

MARY WINEARLS PORTER

ANNA RUSSELL
SHELDON
MEMORIAL
ART COLLECTION

Aunt Anna,

With real appreciation of all her encouragement, and with much love,

Polly

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WHAT ROME WAS BUILT WITH

A DESCRIPTION OF THE STONES EMPLOYED IN ANCIENT TIMES FOR ITS BUILDING AND DECORATION

BY

MARY WINEARLS PORTER

WISCONSIN HISTORICAL SOCIETY

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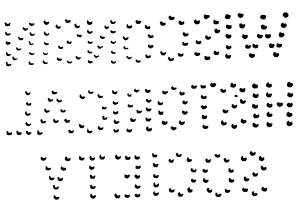

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PREFACE

It is necessary to say a few words about marble itself before describing the special varieties known to the Romans. The name, from the Greek word *marmairein* (to shine), is correctly applied to limestones, which are essentially composed of carbonate of lime, and capable of being used as decorative stones. The larger class of these marbles are metamorphic; that is, they have been transformed from non-crystalline to crystalline rocks. This change is usually caused by earth movement accompanied by heat and pressure.

Of limestones from which the greater part of marble is derived there are two varieties, the most common being formed of the hardened calcareous remains of plants and animals, that is, of organic origin. The other variety is of inorganic formation, and is deposited by water carrying carbonate of lime in solution, thus forming sheets of limestone. Of such is the ordinary compact limestone.

It is difficult to ascertain from which of these two formations a marble may be derived, as in crystallization all fossil remains are often entirely obliterated.

Marble occurs in beds and lenticular masses in

many different geological horizons; the majority of those used for building and ornamental purposes being of the Cambrian, Silurian, Devonian and Carboniferous systems.[1]

Marble, when formed of carbonate of lime without impurities, is pure white, as, for instance, statuary marble. The presence of other substances leads to various colorations. Yellow, pink and red tints are as a rule due to iron oxides; blue-grey, grey and black to carbonaceous matter derived from organic remains.[2]

Marble is soft, can be easily scratched with a knife, and effervesces at the touch of hydrochloric acid.

The name marble is popularly but incorrectly given to any fairly hard and durable material that will take a polish and can be used for decorative purposes, but geologically speaking it is only applied to a rock composed of carbonate of lime.

The visitor in Rome cannot overlook the beauty and variety of the decorative stones which he encounters at every turn, in the museums, churches, temples and palaces, and which may awaken in him a desire to know something of their history and formation.

The guides are not to be trusted as to the names of marbles, which are invented by the stone-cutters, and are usually merely descriptive of colour or

[1] *Stones for Building and Decoration*, by George P. Merrill.
[2] Ibid.

marking, or of some other peculiarity, and which for the most part bear no reference to the true geological character of the stone or the locality whence it comes.

There are several good collections of ancient marbles in Europe that are well worth seeing. The finest of these is in the University Museum, Oxford, England, and is composed of 1,000 fine slabs collected by Faustino Corsi in 1825 and sold to S. Jarrett, a Fellow of Magdalen College, Oxford, who in 1828 presented them to the University. This collection contains excellent examples of all the stones seen in Rome, and a good collection of Italian marbles, a few of which were also employed by the Romans. A duplicate collection belongs to the University of Rome. Two other smaller collections were made by Belli about 1857; one for Cardinal Antonelli which is dispersed; the other is now in the Musée Cinquantenaire at Brussels, and consists of about 800 fair-sized slabs. There is also a collection in the British Museum of some 600 pieces presented by Mrs. Aldworth. In the preparation of this book I have been most courteously afforded every opportunity of inspecting these interesting and important collections.

The study of collections, however, is most unsatisfactory, unless the specimens are of unusual size. Small pieces of a marble are very deceptive; for instance, a block of variegated marble a foot square when cut up would easily yield fifteen or twenty

pieces of entirely different colour and stain. It is far better if possible to study marbles in large blocks, columns or slabs.

In describing the various marbles used by the Romans, the order has been kept as far as possible chronologically, and subsequently alphabetically.

In conclusion it gives me pleasure to express my sincere gratitude to Professor Miers, Secretary to the University Museum, Oxford, through whose kindness I had the opportunity of handling and examining the Corsi Marbles (which I have re-arranged, translating the Catalogue), and to thank Dr. Merrill of the National Museum, Washington, for his cordial assistance. I am also indebted to Miss Evelyn Gifford for her interest and help, which has been greatly appreciated, and to Signor Boni for his kindness in correcting the proofs.

M. W. P.

108 Banbury Road, Oxford.
June 30, 1907.

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WHAT ROME WAS BUILT WITH

'It now remains for us to speak of stones, or in other words, the leading folly of the day; to say nothing at all of our taste for gems and amber, crystal and murrhine vases. For everything of which we have previously treated, down to the present Book, may by some possibility or other have the appearance of having been created for the sake of man; but as to the mountains, Nature has made those for herself as a kind of bulwark for keeping together the bowels of the earth; as also for the purpose of curbing the violence of the rivers, of breaking the waves of the sea, and so, by opposing to them the very hardest of her materials, putting a check upon those elements which are never at rest. And yet we must hew down these mountains forsooth, and carry them off; and this for no other reason than to gratify our luxurious inclinations: heights which in former days it was reckoned a miracle even to have crossed!

'Our forefathers regarded as a prodigy the passage of the Alps first by Hannibal, and more recently by the Cimbri; but at the present day these very mountains are cut asunder to yield us a thousand different marbles, promontories are thrown open to the sea, and the face of Nature is being everywhere reduced to a level. We now carry away the barriers that were destined for the separation of one nation from another; we construct ships for the transport of our marbles, and amid the waves, the boisterous element of Nature, we convey the summits of the

mountains to and fro; a thing, however, that is even less unpardonable than to go on the search amid the regions of the clouds for vessels' (in allusion to vessels made of crystal which, as Dalechamps remarks, were long supposed to be nothing but ice in a concrete form) 'with which to cool our draughts, and to excavate rocks towering to the very heavens, in order that we may have the satisfaction of drinking from ice! Let each reflect when he hears of the high prices set upon these things, when he sees these ponderous masses carted and carried away, how many there are whose lives are passed far more happily without them. For what utility or for what so-called pleasure do mortals make themselves the agents, or more truly speaking, the victims of such undertakings, except in order that others may take their repose in the midst of variegated stones? Just as though too, the shades of night, which occupy one half of each man's existence, would forbear to curtail these imaginary delights.'[1]

Thus Pliny in his scorn of contemporary luxury writes at the beginning of the Christian era. From the foundation of Rome to the later days of the Republic the use of marble for decorative purposes was unknown. The early Romans took particular pride in their own rough stones of the Campagna, which, quarried near at hand, were durable and satisfied the severe taste of that time.

It was about 214 B.C. when Marcellus brought to Rome statues and pictures, the first works of Grecian art to be admired by the Romans; but the walls of Carthage had fallen before the conquering race had learned to value other stones than those of Latium.

Of these the earliest used was a volcanic tuff of a reddish, yellowish or brownish colour, of which the

[1] Pliny, *Natural History*, Book xxxvi, chap. 1 (Bohn).

ancient walls of Romulus are said to have been built, and also those of Servius Tullius (about 563 B. C.). The catacombs were hewn in this tuff, of which the famous Tarpeian Rock is believed by some to have been the ancient quarry. Next the Lapis Albanus or 'Peperino' must be mentioned, a volcanic tuff of a greyish colour, speckled with black; and later the Lapis Tiburtinus, the 'Travertino' of the modern Roman stonecutter, a calcareous deposit found at Tivoli, porous, of a light creamy hue, and very durable, hardening under exposure, which was employed in the construction of the Cloaca Maxima, as was also the Lapis Albanus. Both these stones were used in the building of the temple of Fortuna Virilis during the reign of Servius Tullius.[1] Types they might seem of Republican simplicity and fortitude.

In an epistle Seneca writes: 'I write this, Lucilius, from the famous villa of Scipio Africanus. I found this, his villa, built of square stone.[2] . . . a bath narrow and somewhat dark after the ancient custom. Under this low and sordid roof stood Scipio. He disdained not to tread so vile and mean a pavement. But who is there in our time that would condescend to bathe in like manner? A man thinks himself poor and mean unless the walls are decorated with large and precious embossments; unless Alexandrian marble is pointed and inlaid with Numidian rough-cast; unless a rich and curiously variegated plaistering be spread upon them in picturesque;[3] unless the roof is covered with glass-work, and unless the Thasian stone, once reckoned a scarce and rare ornament even in some temples, now compass about our ponds.'[4]

[1] Probably of this reign.
[2] According to Corsi square stone of Alban or 'peperino'.
[3] Mosaic work.
[4] *Epistles of Seneca*, no. 86 (trans. Thomas Morrell).

Art was despised, and in his second oration against Verres, the great collector, Cicero, faithful to the maxims of the Republic, speaks with disdain of the arts and works of the most famous artists, even affecting to be unacquainted with their names. He regarded the taste as unworthy of the Romans; although later it seems that he himself became infected with the collector's enthusiasm.

The treasures of Greek art, plundered by Roman generals, woke in the spoilers first the passion for collecting, which later they indulged with such boundless extravagance. It would seem that in many cases, then as now, the rarity of the object rather than its beauty was the attraction to the buyer.

Horace deplored that the Romans who sojourned in Greece adopted the customs of that country, and severely reproved those of his countrymen who loved gold, ivory and marbles, at the same time praising poverty and simplicity.

Later the desire to embellish their city took hold of the Romans; and Pliny who, as we have already seen, passionately disapproved of this fashion, mourns the fact that, although there were still in existence censorial laws forbidding dormice and other delicacies to be served at table, 'no law has been passed forbidding marble to be imported, or the seas to be traversed in search of it!'[1]

This mania for rare and costly building material brought from a distance of thousands of miles began about 144 B. C., and it is said that Quintus Metellus Macedonicus was the first to introduce it into Rome,[2]

[1] Pliny, *op. cit.*, Book xxxvi, chap. 2.

[2] The celebrated Niger Lapis of the Roman Forum, which has given rise to so much discussion, was probably the first piece of marble ever brought to Rome; but it can hardly be connected

for which he was reproached by Velleius Paterculus as the first corruptor of republican simplicity.

Mamurra, who dwelt upon the Caelian Hill, was the first person in Rome to cover the whole of his walls with marble, and to erect solid columns of Carystian or Lunian. His passion for collecting seems, however, to have been modified by another characteristic. It is told of him that, 'after having walked long and anxiously in the squares where golden Rome ostentatiously displays her riches, he uncovers the tables square and round; and asks to see some rich ivory ornaments which were displayed on the upper shelves. Then, having four times measured a dinner-couch for six, wrought with tortoise-shell, he sorrowfully regretted that it was not large enough for his citron table. He consulted his nose whether the bronzes had the true Corinthian aroma, and criticized the statues of Polyclitus! Next, complaining that some crystal vases had been spoiled by an admixture of glass, he marked and set aside ten Myrrhine cups. He weighed ancient bowls, and inquired for goblets that had been ennobled by the hand of Mentor. He counted emeralds set in chased gold and examined the largest pearl ear-pendants. He sought on every counter for seal sardonyxes and cheapened some large jaspers. At last, when forced by fatigue to retire at the eleventh hour, he bought two cups for one small coin, and carried them home himself.'[1]

Crassus, whose nickname was the Palatine Venus, was the first to possess pillars of foreign marble, and

with the general introduction of marble into the city. This stone, thought by some authorities to have been the black marble of Taenaron, is unlike any variety used at any time in Rome; and Signor Boni has so far been unable to identify it.

[1] Martial, Book ix, Epigram 59, On Mamurra (Bohn).

Lepidus to have the lintels of his house of Numidian marble, a thing for which he was greatly censured.

At this time (about 88 B. C.) Lucullus introduced the gray or black marble named after him; and a year later Sylla stole the columns of the temple of the Olympian Jupiter at Athens, and brought them to Rome for the buildings in the Capitol.

About 58 B. C. M. Scaurus, who was Aedile at the time, erected the famous theatre to be used only for a few days, which Pliny says was 'the greatest work that has ever been made by the hands of man, even when intended to be of everlasting duration'.[1] This theatre consisted of three storys; the first was of marble supported by 360 columns of marble (four of which were 38 feet in height), between which were placed 3,000 brazen statues. The second story was of glass, a species of luxury, says Pliny, which ever since that time has been quite unheard of; and the third of gilded wood. This theatre accommodated 80,000 people! So great were the masses of marble carried through the streets of Rome for his private house that the contractor for the public sewers compelled Scaurus to give security for the possible damage that might be done in the carriage of the columns to the Palatium. Pliny was almost beside himself with indignation at this performance, and says: 'When so bad an example as this was set, would it not have been advisable to take some precautions for the preservation of the public morals? And yet the laws still preserved their silence, when such enormous masses as these were being carried past the earthenware pediments of the temples of the gods, to the house of a private individual!'[2]

Caesar either pretended or wished to restrain the

[1] Pliny, *op. cit.*, Book xxxvi, chap. 24.
[2] Ibid., chap. 2.

advance of luxury, and imposed a tax on every column of foreign marble brought to Rome, but evidently this law was not long in force, as Cicero, in writing to Atticus concerning some columns says, 'you may perhaps find that I am not liable to the pillar tax. However, I think I was told by Camillus that the law had been altered.'[1]

It was not until the reign of Augustus, however, that the passion for marbles exceeded all bounds. Augustus himself, for more than forty years, lived in a house the porticoes of which were supported by columns of Lapis Albanus and unadorned by pavements of precious marbles; but it was his boast that he found Rome of unbaked brick and left it of marble. The Emperor obtained this result, seconded by his friend and minister, Agrippa, and succeeded in leaving behind him truly a city of marble; to which the Pantheon bears sufficient witness.

It was thought that marble-faced walls rendered the rooms fresher, and Martial jested at those 'who lived surrounded by the cold stones of Sparta in order to temper the heat'; and Sidonius Apollinarius (A. D. 431) in offering his house to a friend says, 'it is naturally fresh, but not rich in strange marbles.'[2]

Tibullus noted that the excessive transport of marble crowded the streets of Rome with drays and carts laden with columns, and Ovid says, 'Decrescunt effosso marmore montes.'[3] Juvenal describes in the following verse the hugeness of the blocks brought to Rome from Carrara, and the consequent dangers to which the people were exposed:—

'Hark! groaning on, th' unwieldy wagon spreads
Its cumbrous freight, tremendous! o'er our heads,

[1] *Letters of Cicero* (trans. Evelyn S. Shuckburgh).
[2] Corsi, *Delle Pietre Antiche.*
[3] 'As the marble is quarried the mountains shrink.'

Projecting elm or pine that nods on high,
And threatens death to every passer-by,
Heavens! should the axle break which bears a weight
Of huge Ligurian stone, and pour the freight
On the pale crowd beneath; what would remain,
What joint, what bone, what atom of the slain?
The body, with the soul would vanish quite,
Invisible as air, to mortal sight!'[1]

The two following stories may be given as examples of Roman extravagance: Pliny says that Pompey was the first to dedicate vases and cups made of Murrhine in the Temple of Jupiter Capitolinus, a circumstance which soon brought them into private use. 'This species of luxury, too, is daily on the increase, a single cup which would hold no more than three sextarii having been purchased at the price of 70,000 sesterces. A person of consular rank, who some years ago used to drink out of this cup grew so passionately fond of it as to gnaw its edges even, an injury, however, which had only tended to enhance its value.'[2] Again, T. Petronius, a man of consular rank, when on his death-bed,[3] hating the Emperor Nero, and determined that the imperial table should not profit by his death, broke a Murrhine wine-cup that had cost 300,000 sesterces. But Nero in royal style outdid all rivals by giving one million of sesterces for a single sacrificial bowl; says Pliny, 'a fact, well worthy of remembrance, that an emperor, the father of his country, should have drunk from a vessel of such costly price!'[4]

The passionate desire to obtain marble for the ornamentation and decoration of temples, baths,

[1] *The Satires of Juvenal*, iii, verse 386 (trans. William Gifford).
[2] Pliny, *op. cit.*, Book xxxvii, chap. 7.
[3] It was customary for a man to make the emperor his heir.
[4] Pliny, *op. cit.*, Book xxxvii, chap. 7.

forums and private houses in the luxurious days of the Empire can hardly be exaggerated. The Roman baths were particularly ornate and luxurious, and Seneca in speaking of certain of them says:—

'What noble statues! What vast pillars supporting nothing; but placed there for mere ornament, and the vain ostentation of expense! What large and far-sounding cascades! What, we are arrived to such a pitch of delicacy and extravagance that we cannot tread but upon precious stones.'[1] The wall-linings, columns and pavements of the Baths of Caracalla were one mass of gorgeous material; the rich Numidian yellows, Phrygian purples, and deep yellows, reds and browns of the Oriental alabaster forming striking contrasts with the whites of Luni, the red porphyries, green serpentines and Egyptian granites.

The emperors themselves, moved by an inordinate desire of obtaining marble, through confiscation or purchase took possession of all the most celebrated and valuable quarries, the smaller and less known ones alone remaining the property of private individuals. Suetonius narrates how Tiberius stole quarries both from private individuals and from cities.[2] No wonder that the prices of private mansions reached fabulous sums. For example: Messala bought the house of Antonius for a sum corresponding to £33,000. Cicero gave for the house of Crassus £31,000. The house of Claudius had cost £131,000, that of Scaurus was valued at £885,000.[3] And these were prices during Republican times! Every building of any importance or pretence glistened within and without with columns, walls,

[1] Seneca, *op. cit.*, to Lucilius, Epistle 86.
[2] Bruzza, *Iscrizioni dei Marmi Grezzi.*
[3] Rodolfo Lanciani, *Ancient Rome.*

statues and pavements of exquisite and rare marble, hardly any other method of decoration being known.

Had Rome herself been surrounded by marble hills, our wonder would not be so great, but the encircling country is purely volcanic, and all the marble imported was brought from Africa, Asia Minor and Greece.

The abundant supplies of marble in the more immediate vicinity[1] of the capital (that is to say, in Italy itself) were not the first to be employed; but although they did not equal those imported, they were not to be despised. At times the supply of marble totally failed, and then imitations of every description were resorted to. The common kinds also were painted to imitate the stains of the rarer ones; and various varieties of inlaid work were introduced. As Pliny himself relates in speaking of painting: 'At the present day it is completely banished in favour of marble and even gold. For not only are whole walls now covered with marble, but the marble itself is carved out or else marqueted so as to represent objects and animals of various kinds. No longer now are we satisfied with formal compartitions of marble or with slabs extended like so many mountains in our chambers, but we must begin to paint the very stone itself! This art was invented in the reign of Claudius, but it was in the time of Nero that we discovered the method of inserting in marble spots that do not belong to it, and so varying its uniformity; and this, for the purpose of representing the marble of Numidia variegated with ovals, and that of Synnada veined with purple, just, in fact, as luxury might have willed that Nature should

[1] The quarries at Carrara were opened about 100 B. C.

produce them. Such are our resources when the quarries fail us, and luxury ceases not to busy itself, in order that as much as possible may be lost whenever a conflagration happens.'[1]

The quantity, beauty, and endless variety of magnificent marble still remaining in Rome causes us to wonder of what that city must have boasted before undergoing two thousand years of plunder, havoc and change. At the present day 9,000 whole columns of marble have been enumerated by Lanciani, 390 of which he himself has brought to light. He estimates the number of columns landed at Ostia in ancient times to be 450,000 at least, and says there is no fear of exaggeration in this estimate, considering the amount of destruction, of breaking up, and of burning into lime that has been accomplished in Rome since the fall of the Empire; and columns represented but a small item in the marble trade of that city!

Columns have been found measuring six feet in diameter and fifty-five feet in height, for example: some discovered in May, 1887, among the ruins of Trajan's Temple; and blocks weighing sometimes twenty-seven tons,[2] like the one belonging to the Temple of the Sun, now lying in the Colonna Gardens on the Quirinal.[3] These facts give one an idea of what the marble trade of ancient Rome must have been.

The early taste for marble in Rome for decorative purposes survived throughout many centuries, and churches in Italy from the earliest times were lavishly endowed with 'ancient marbles', for the most part

[1] Pliny, *op. cit.*, Book xxxv, chap. 1.

[2] Signor Boni tells me that the blocks of Carrara marble in the pedestal of Trajan's column weigh eighty tons each.

[3] Lanciani, *op. cit.*

spoils of the more ancient temples and other buildings. Almost every building in Rome at the present day is resplendent with marble of endless variety and beauty.

During the reigns of the despot princes of Italy, marble was considered one of the choicest of spoils. Each prince, either ambitious to leave behind him a work bearing his name, or from a true love of art, or perhaps as an act of piety, built a church or chapel or some other building of importance, which was invariably decorated with costly stones.

During the Middle Ages, the Medici were the greatest patrons of the marble industry, and under the government of that house the quarries at Carrara were extensively developed.

Michelangelo many times visited Carrara, for the express purpose of choosing the material for work ordered by various members of that illustrious family. The quarries of jasper at Barga were also in the possession of the Medici, and supplied much of the gorgeous material employed in their chapel at Florence.

The great Sigismondo Malatesta of Rimini brought one hundred wagon loads of ancient marbles from S. Appollinare in Classe at Ravenna (the second richest marble city of the world) for the decoration of his own temple of S. Francesco at Rimini. The people of Ravenna complained bitterly to the Doge Francesco Foscari, saying that Sigismondo had despoiled their church. Sigismondo then sent two hundred gold florins to the Abate, which settled matters to the satisfaction of all parties.[1]

The industry of the scarpellino is still a thriving one in Rome and many are the queer dusty little

[1] See *Sigismondo Malatesta*, by Edward Hutton.

shops in the Via Sistina where copies of the antique sculptures, mosaics and marble table tops of every description are displayed to attract the eye of the passer-by. Rome still boasts that she is the richest marble city in the world.

> Day treads down day, and sinks amain,
> And new moons only wax to wane,
> Yet you upon death's very brink,
> Of piling marbles only think,
> That yet are in the quarry's womb,
> And all unmindful of the tomb,
> Rear gorgeous mansions everywhere;
> Nay, as the earth too bounded were,
> With bulwarks huge thrust back the sea
> That chafes and breaks on Baiae.[1]

[1] Horace, Book ii, Ode 18 (trans. Sir Theodore Martin).

STONE FROM ITALY

ROME

Volcanic tuff

THE volcanic tuff of Rome and the neighbourhood is a mixture of scoriae, lapilli and ashes, which formed great strata during the Glacial or Postpliocene epochs.[1]

There are three distinct strata of this tuff: the 'stony' (tufa litoide) employed as a building stone; the 'granular' tuff (tufa granulare) which is far too soft to be used for building purposes, and in which the catacombs are excavated, and finally there is the 'sandy' tuff (pozzolana) which, mixed with mortar, is used for building purposes.[2]

The excavators of the catacombs avoided with equal care the solid stone of the stony tuff and the friable pozzolana, selecting the strata of medium hardness, which enabled them to form the vertical walls of their galleries and to excavate loculi and cubicula without severe labour and also without fear of their falling in.[3] These catacombs are outside the walls of Rome between the Porta Salaria and Porta Paolo. Nibby believes that one small section of them, in which servants and the poor were buried, was of Pagan origin. Later the Jews and, in the first four centuries of our era, the Christians used these subterranean galleries, which were exclusively hewn in the soft brown or red-brown

[1] *I. Tesori Sotterranei dell' Italia*, by G. Jervis.
[2] *Encyclopaedia Britannica*, see Catacombs.
[3] Ibid.

volcanic tuff, for their burial places. It was in these cemeteries that the Christians took refuge during the fearful persecutions; but after the conversion of Constantine they were again used as places of burial, and little by little became the resort of large numbers of pilgrims and the scene of many religious ceremonies. During the pontificate of Damasus I, in the second half of the fourth century, they began to be regarded with extraordinary veneration, and the Pope himself took a special interest in the restoration of the works of art which they contained, and in the renewal of the inscriptions on the graves of martyrs.

According to tradition, the bodies of St. Peter and St. Paul rested for a year and seven months in these catacombs (under the Basilica of St. Sebastian) previous to their removal to the basilicas which bear their names.

To return to the employment of the volcanic tuff. It was the first of all stones to be employed in Rome, and earlier still it was used in the ancient Etruscan city of Veii.[1] Of such material Canina believes the ancient walls of Romulus to have been constructed, as also those of Servius Tullius (563 B.C.), remains of which are still to be seen.[2]

In 1887, traces of very ancient walls were discovered under the walls of the Cloister of Ara Coeli. These consisted of square masses of volcanic tuff, believed to have been part of the Capitoline Arch of twenty-eight centuries ago![3]

On one side of the Capitoline Hill which is formed of this brownish tuff is the famous Tarpeian Rock; this being one of the localities where the stone was

[1] Signor Boni tells me that the tuff was used at a still earlier period.

[2] Signor Boni says: 'The so-called works of the kings are, so far as I could ascertain, of the republican age.'

[3] Jervis, *op. cit.*

quarried at the earliest date. In this rock was built the celebrated Mamertine prison, where state criminals were confined.

Vitruvius gives the volcanic tuff in the list of the building stones employed in his time. The tuff of the reddish colour was known as Lapis Ruber; and the variety found at the ancient Fidenae, seven kilometres from Rome, was called Lapis Fidenas.

Strabo also mentions those 'denominated the red-stone quarries' (Book v). The volcanic tuff was employed in the Cloaca, in the Rostra and in the Colosseum.

It was the characteristic stone of early Republican times; which later gave place to marble, that more costly and beautiful material of the imperial days.

Lapis Albanus, Lapis Gabinus, Peperino [1]

Peperino consists of volcanic ashes in which are embedded minute scoriae of black lava, giving the stone a peppered appearance, hence its name. There are two varieties of this stone, which was so extensively used in Rome from the earliest times for building purposes. One of these is the Lapis Gabinus, quarried near the ancient city of Gabii, which was half way between Rome and Palestrina. Gabii, even more ancient than Rome, was surrounded by a solid wall of peperino, which the Romans had great difficulty in breaking through when they conquered and destroyed the city.[2]

The peperino of Gabii is of a grey brown colour spotted with the black lava, and is harder than the Lapis Albanus; Vitruvius enumerates it among the building stones employed in his day, and Tacitus [3]

[1] From the Italian *pepe*, pepper. [2] Jervis, *op. cit.*
[3] Tacitus, *Annals*, Book xv, chap. 43 (Bohn).

records that Nero, after the fire of Rome, ordered that the buildings should be 'arched with stone from the quarries of Gabii or Alba, that stone being proof against fire'. Both these stones were derived from the same extinct volcanoes of Latium.

A few ruins in peperino are still to be seen at Gabii; and in Rome it was employed in that marvel of sanitary engineering, the Cloaca Maxima.

At Albano Laziale, near the Lago d'Albano, was quarried the well-known Lapis Albanus. According to tradition the Emperor Augustus lived in a house, the portico of which was supported by columns of this stone.

Such was the stone employed in the tomb of the famous Scipios, along the Appian Way, and for the first Capitoline temple, as also for the Servian wall and Temple of Vesta.

Peperino was, and is still, quarried at Marino, the ancient Castrimaenium.[1]

Lapis Tiburtinus, Travertine, Travertino

'The Tiburtine stones, and those of similar nature, resist great weights as well as the action of the weather, but are easily injured by fire.'[2]

The ancient Tibur was founded, according to a legend, many centuries before Rome, by the Siculi. Later, they were expelled by the Greek Tiburtus; wherefore the name Tibur was given to the town (now called Tivoli, a corruption of the Latin) which has produced for so many centuries the celebrated Lapis Tiburtinus or travertine, deposited by running streams and springs.

This calcareous deposit 'is laid open in sections

[1] Jervis, *op. cit.*
[2] *Vitruvius*, Book ii (trans. Joseph Gwilt).

along the banks of the great chasm into which the waters of the Aniene precipitate themselves, and shows horizontal beds of alternating tufa and travertine, attaining a thickness of nearly 500 feet'.[1] This stone is of quaternary recent and contemporaneous formation.[2] It was extensively employed by the Romans, especially before the introduction of marble, for all building purposes as also for sarcophagi.

The quarry most extensively worked during the Roman Empire was that of del Barco, situated rather above the Bagni delle Acque Albule, on the right of the river Aniene. The travertine of Tivoli is very porous, whitish or cream coloured, hardens under exposure, is easily sawn into slabs, is submissive to the chisel and an excellent building stone in every respect. It is sufficient to mention the Colosseum as a proof of its durability.

The Emperor Augustus largely employed this stone with the white marble of Carrara for building purposes and for innumerable restorations.

Travertine was employed in the construction of the Theatre of Marcellus, the Arch of Drusus, the tomb of Cecilia Metella,[3] and for the Colosseum, which was begun by Vespasian and completed by his son Titus. This Amphitheatre held 80,000 spectators, and, says Martial, 'every work of toil yields to Caesar's Amphitheatre; fame shall tell of one work for all.'[4]

Towards the end of the fourteenth century, Paul II built the Palazzo di Venezia with stones taken from the Colosseum; and in 1540 Paul III employed it for the Palazzo Farnese. The travertine of the

[1] *Building and Ornamental Stones*, by E. Hull.
[2] Jervis, *op. cit.* [3] Ibid.
[4] Epigrams of Martial, 1, On the Amphitheatre (Bohn).

Palazzo della Cancelleria came from the same source.[1]

According to Nibby a travertine arch was erected in the year A.D. 7 near the Ponte Sublicio on the Tiber, bearing an inscription with the names of Publius Cornelius Lentulus and Titus Quintus Crispinius Valerianus; but in 1480 the arch was destroyed to make stone cannon-balls. This gives one an idea of the early use of the stone, as does also the fact that the Temple of Vesta, at Tivoli, and the Temple (so called) of Sybilla Tiburtin (now the Church of San Giorgio) were also made of the same material.[1]

The travertine of Tivoli is still employed in Rome for various building purposes.

Lapis Silex, Basaltic Lava, Selce

This stone, described by Vitruvius as Silex or Lapis Siliceus, is a basaltic lava derived from the extinct volcanoes of Latium, and employed from Late Republican times in Rome as a paving stone; for this purpose it could not be excelled by any other material. All the roads leading out of the capital, in some cases to great distances, were paved with Lapis Silex hewn in polygonal pieces, the measurements of which were evidently exceedingly precise; for the pieces are fitted together with the most wonderful accuracy, telling of stupendous labour and faultless skill.

Livy tells us that the censors Q. Fulvius Flaccus and A. Postumius Albinus ordered that the Roman roads should be paved with Silex.[1] Various remains of the ancient pavements are still to be seen in

[1] Jervis, *op. cit.*

Rome and the neighbourhood; including those of the Appian Way on which, about three miles from the city, one of the ancient quarries was situated. The Sacra Via was likewise paved with this stone, which was also employed in the Cloacae.

The best of the modern quarries is that of Capo di Bove, which furnishes Rome with paving material to-day. This is cut into diamond-shaped blocks, and forms the pavement of the Piazza di San Pietro.[1]

The stone is also quarried to some extent at Marino, the ancient Castrimaenium. It is of a dark bluish hue, and on account of its great durability is extensively used for paving purposes in Rome.[1]

CARRARA

Marmor Lunense, Carrara Marble

'. . . Of these Luna is a city and harbour; it is named by the Greeks the harbour and city of Selene.[2] The city is not large, but the harbour[3] is very fine and spacious, containing in itself numerous harbours, all of them deep near the shore; it is, in fact, an arsenal worthy of a nation holding dominion for a long time over so vast a sea. The harbour is surrounded by lofty mountains[4] from whence you may view the sea[5] and Sardinia and a great part of the coast on either side. Here are quarries of marble, both white and marked with green, so numerous and large as to furnish tablets and columns of one block; and most of the material for the fine works, both in Rome and other cities, is furnished from hence. The transport of the marble

[1] Jervis, *op cit.* [2] The Moon. [3] Bay of Spezia.
[4] The Carrara Mountains. [5] Mediterranean Sea.

is easy, as the quarries lie near to the sea, and from the sea they are conveyed by the Tiber.'[1]

Thus Strabo describes the most extensive and celebrated quarries of the world, which have been worked since the beginning of the Christian era, and at the present day supply Europe and America with thousands of tons of material each year.

It has not been clearly proved that the Carrara marbles were known to or worked by the Etruscans, although various pieces of Etruscan sculpture have been found in white crystalline marble, but, as Jervis remarks, in the absence of fresh fracture it is impossible to judge of the material employed.[2]

The ancient city of Luni, whose walls Namatianus Rutilius said rivalled the white lily in beauty, was about twelve kilometres from the modern Carrara, and a few traces of it still remain.

When Ciriaco Anconitano visited Luni in 1442 the city was already in ruins. He speaks of the enormous dimensions of the blocks of marble employed in the construction of the walls, which measured 8 feet by 4 feet.

During the Middle Ages Luni became a convenient quarry site of cut stone to the neighbouring city of Sarzana, sharing the fate of the Colosseum, and many other of the classical edifices of Rome; so it is not to be wondered at, that only a few traces remain of the once industrious and thriving city of Etruria.

The Romans, after having for many years imported vast quantities of marble from Greece, Africa and Asia Minor, at length turned their attention to sources nearer to the capital, which perhaps from their very nearness, and the comparative ease with

[1] Strabo, Book v, chap. 2 (Bohn).

[2] Jervis, *op. cit.* The following information on Carrara has been drawn almost exclusively from Jervis.

which the supplies could be obtained, had attracted them less in the first instance than those localities which were more difficult of access; the obstacles of transportation only increasing the value of the material in their eyes.

According to Pliny, Mamurra who dwelt upon the Caelian Hill was the first to cover his walls with marble, and to have all the columns of his house made of nothing but solid marble, and 'that, too, marble of Carystus or of Luna'[1]. This is the earliest record we have of the employment of Marmor Lunense in Rome, and Professor Carlo Promis believes that Mamurra's house was built about 48 B. C.[2]

Later Juvenal describes in verse[3] the enormous blocks brought to Rome, and the danger to which the people were exposed when these masses were being carted through the streets.

In 1810 a block of Carrara marble was found in the Canale di Colonnata, on which were inscribed the names of Decius Halerius, Agrippa and Caius Sulpicius Galba, consuls during the reign of the Emperor Tiberius (born 42 B. C., died A. D. 37). Another block of the time of Septimius Severus was found many years previously in the neighbourhood of Carrara; but the most interesting discovery belonging to the Roman period was a bas-relief found at Fantiscritti, which will be described later.

The extravagance with which the Emperor Augustus (of whom Livy says, 'templorum omnium conditor ac restituor'[4]) replaced the use of brick by that of marble further increased the demand for material from Luni; and Servius assures us that the Temple

[1] Pliny, *op. cit.*, Book xxxvi, chap. 7.
[2] Bruzza, *Iscrizioni dei Marmi Grezzi.*
[3] See page 7.
[4] 'The founder and restorer of all the temples.'

of the Palatine Apollinus which the Emperor built was constructed of solid blocks of that marble.[1]

Bruzza notes that in the interesting will of Langres of the later half of the first century the heirs are advised that the altar before the sepulchral building must be 'ex lapide lunensi quam optimo'[2], and also of such marble the door of the edifice. This proves that those quarries called by Statius 'nivea metalla'[3] already exported marble to some distance from Italy.

The quarries of the valuable Carrara marbles are in the range of the Apennines overlooking the beautiful Bay of Spezia, in the neighbourhood of Carrara, Massa, and Serravezza. 'The part of the Apennines which contains these quarries is highly picturesque. The central ridges of pale crystalline limestone and schist with serried outline rise to elevations of 4,000 to 5,000 feet; these are bounded by less elevated eminences, clothed with olive groves, vineyards and forest trees up to their summits. From the base of the hills a richly cultivated alluvial plain, evidently an ancient sea-beach, stretches to the sea, and forms a level course for the Strada Ferrata, by which the blocks of marble are conveyed away to their various destinations, or to ports for shipping.

'The best quarries are opened along both sides of a deep valley, in which the village of Carrara is situated, and along which flows the Torano. In general the marble has a light bluish hue, or is white with bluish veins, such kinds being generally sawn into slabs at the numerous cutting and polishing mills situated along the course of the stream.

[1] Bruzza, *op. cit.*
[2] Of the best quality of Lunense stone.
[3] Quarries of snow.

'The purer varieties, which are perfectly white, crystalline and free from flaws, are quarried in blocks sometimes 10, 12, or 14 feet in length, for statuary purposes, and drawn on strong wagons by teams of bullocks down to the railway station at Carrara, where they are sent to their various destinations. The town of Carrara itself, however, contains several studios of sculptors, who fashion the stone at the spot where it is quarried.

'An examination of the marble beds and their associated schistose strata shows at once that their crystalline structure is the result of metamorphism. They are referable to the Liassic and Oolitic, or Jurassic series as determined by Professor Pilla[1], who showed that the dark grey limestone of the Valley of Tecchia, containing Jurassic fossils, graduates by changes of colour and crystallization into the pure white of Carrara and Massa; a conclusion in which Sir R. I. Murchison, who has made a detailed examination of the whole chain of the Apennines, has fully concurred. Between the two great beds of crystalline limestone worked in the valley of the Torano, are calcareous schists, passing into micaschists; and the impression I received, upon a rather rapid survey in 1871, was that the two great beds of marble are disconnected portions of the same mass on opposite sides of a sharp anticlinal fold shown in these schists. The quarries at Massa produce blocks rivalling those of Carrara.'[2]

Jervis tells us that the marble mountains of the Apuan Alps extend without interruption along the mountainous region from Carrara as far as Stazzema

[1] Prof. Pilla showed that Carrara belonged to the Liassic and Oolitic systems. This was suggested years previously by Sir H. de la Beche and Sir Roderick Murchison confirmed it.

[2] Hull, *op. cit.*

on the side facing the sea, the wonderful white marbles approaching within two kilometres of Carrara. These, he says, consist of stratified beds, at times visible, but more generally obliterated, resting on compact limestone of a dark colour, and without any traces of a crystalline grain. These stratified beds are covered by pre-paleozoic mica- and talc-schists. The lower series of marbles are generally of a bluish colour, and are called 'Bardigli'. Above these, Jervis continues, come the statuary and ordinary white marbles of general use in architecture, for decoration of various kinds and public monuments, and the white marbles with lead-grey veinings employed for interior work. The breccias and policrome conglomerates of bright colours, chiefly composed of fragments and pebbles of white crystalline marble with a red or purple ferruginous cement called 'Pavonazzi'[1] and 'Mischi'[2], are described by some geologists as beneath the ordinary white and statuary marbles in stratigraphical order, but Jervis believes these to be undoubtedly posterior, and says they contain fragments of metamorphized crystalline marble clearly showing their antiquity. The geological age of the Apuan Alps has given rise to more discussions than that of any other group of mountains. Some geologists consider them to be of very ancient origin, pre-paleozoic, others paleozoic, and others again lower mesozoic.

Jervis attributes the short duration of the white crystalline marbles when exposed to the atmosphere to the presence of carbonate of magnesia.

The most celebrated of all the quarries of Carrara is that of Polvaccio, which for almost two thousand

[1] From *pavonazzo*, purple.

[2] From *mischio*, mixture, referring to the mixed colouring of the marble.

years has supplied material for the works of the greatest architects and sculptors, and which is said by some authorities to have supplied the marble for that marvellous work, the Column of Trajan.[1] Michelangelo made ten journeys to Carrara to select material for his work, and in 1504 obtained from the quarry of Polvaccio the marble for his famous David, now in Florence.

Vasari tells us that after having received Pope Julius II's order for the famous tomb 'Michelangelo then set hand to his work with great spirit, repairing for that purpose with two of his disciples to Carrara, to superintend the excavation of the marbles . . . In those mountains, then, he spent eight months without receiving any additional stipend or supplies of any kind, amusing himself meanwhile by planning all manner of immense figures to be hewn in those rocks in memorial of himself, as did certain of the ancients, invited thereto by the vast masses before him. Having selected all that he required, he loaded them on ships which he despatched to Rome, where they filled the entire half of the Piazza which is towards Santa Caterina, and the whole space between the Church and the corridor leading to the Castello, where Michelangelo had his studio, and where he prepared the statues and all other things needful for the tomb'.[2] This indeed might be called the beginning of the 'Tragedy of the Tomb'; for the Moses at S. Pietro in Vincoli is the only result of that tremendous project and hope of the Sculptor. At the quarry of Polvaccio Michelangelo also selected the material for the figures of Day and Night, Even-

[1] Signor Boni endorses the opinion that the column is of Carrara marble.

[2] Vasari's *Lives of the Painters*, by Blashfield and Hopkins, vol. iv.

ing and Dawn, of which the poet Giovanni Strozzi wrote:—

> Night, whom in shape so sweet thou here may'st see
> Sleeping, was by an Angel sculptured thus
> In marble, and since she sleeps hath life like us;
> Thou doubt'st? Awake her: she will speak to thee.

And in answer to which Michelangelo wrote, in allusion to the suppression of political liberty:—

> Sleep likes me well and better yet to know
> I am but stone, while shame and grief must be,
> Good hap is mine, to feel not, nor to see;
> Take heed, then, lest thou wake me: ah, speak low.[1]

Condivi tells us the following story of Michelangelo at Carrara: 'One day, having ascended a mountain which commands a widely extended prospect over the Mediterranean, he was moved by the sight of the huge blocks of marble lying around him to plan the erection of a colossal figure which could be seen by mariners far out at sea.' The project, like that of Dinocrates for fashioning Mount Athos into a statue of Alexander, was never carried out. As an example of a large block might be mentioned the one seen by Jervis at Polvaccio in 1859, measuring 18 c. m., valued by the owners, Messrs. Fabricotti, at 25,000 lire; but, being unable to sell it, they were obliged to cut it up into pieces of smaller dimensions.

It was at the quarry of Polvaccio that Canova found the block of statuary marble without a flaw (although measuring 600 cubic palms, 14 c. m.), of which he made the colossal statue of Napoleon I in Apsley House.

The quarry of Polvaccio not only yields the fine grained statuary marble, which is homogeneous,

[1] Swinburne's translation; see also Swinburne's sonnet 'In San Lorenzo'.

snowy white, more opaque even than that of Crestola, and of greater density than any other Carrara marble, but also an ordinary white marble of good quality.

The other famous quarry of antiquity is that of Fantiscritti, where a clear white marble of a delicate pearly tint is found—the best quality for architecture, especially for works exposed to the air.

That this quarry was worked by the Romans is proved by the many roughed out blocks found on the spot, which have remained there for hundreds of years.

High up on the face of the rock itself was a little shrine ornamented with a bas-relief representing Jupiter with extended arms, supported by Hercules and Bacchus. The shrine was seen in its original position by Jervis in 1859 but has since been sawn away, and is now preserved in the Accademia di Belle Arti at Carrara. From this bas-relief the quarry took its name Fantiscritti.[1]

According to Ciriaco Anconitano the Romans quarried the white marble employed for the great monolithic door-posts of the Pantheon from Fantiscritti, and the monolithic columns of the Church of San Francesco da Paolo at Naples also came from here.

Other examples of Marmor Lunense are the Apollo Belvedere, the Arch of Constantine, many of the columns of the Roman Forum, and of the Temple of Vespasian; and, according to Repetti, this marble was employed to some extent in the Baths of Caracalla.

The marble quarried by the Romans was sent from the city of Luni to Avenza, shipped to Leghorn, and from thence to Rome.

[1] From *fante*, soldier, *scritto*, written or inscribed.

Of the quarries worked in modern times those of Ravaccione, Betogli and Crestola are among the most important. The marble of Ravaccione is clear and white, fine grained, completely homogeneous and not easily chipped. This marble is particularly desirable for architectural and statuary purposes, and is the most durable of all the Carrara marbles. For these reasons not all the marble known commercially as Ravaccione in reality comes from this quarry.

The marble of Betogli is snowy white in colour, and a favourite with sculptors, owing to the ease with which it can be worked. However, it is not durable, and the sculptor Monti assures us that when it is exposed to the London atmosphere the soot permeates through it rapidly even to the depth of 3 or 4 cm., covering the surface with a black crust.

Near the village of Torano is the quarry of Crestola, where the most celebrated of all the Carrara marbles is obtained. This stone is most especially valued on account of its brilliancy and firmness, and the ease with which it can be worked into the most delicate forms of sculpture: in this respect it is superior to the marble of Polvaccio or even of Betogli. It presents a crystalline structure, and is delicately and uniformly tinged with yellow.

Benvenuto Cellini writes: 'This kind of marble, more inclined to flesh colour than to white, I judge by experience to be the most satisfactory and most beautiful that can be worked.'

A few words must be said about the celebrated quarries Stazzema and Serravezza in the province of Lucca. At Stazzema is quarried the marble commercially known as Mischio[1] di Serravezza. This

[1] Mixture, on account of its mixed colours, usually purple and white.

marble is usually a breccia or brecciated. The fragments are white and the cement purple, violet or reddish. Other varieties are simply stained and veined, the colours being nearly always purple and white. 'Bardigli,' white statuary marble and dark breccias are also found here, but Stazzema is most famous for its Mischio, which was used so extensively in the sixteenth century for interior decoration. The quarries are of great antiquity, and some time before 1845 the geologist Leopoldo Pilla recognized the Mischio of Stazzema as one of the marbles employed by the Romans. Jervis believes that he discovered it in 1885 among the decorative stones found in recent excavations near the Sacra Via.

The quarries remained inactive for about fourteen centuries, the first we hear of them again being in 1565, when Michelangelo discovered here a convenient site in which to open a quarry. Vasari was sent later to inspect the stone and, on his favourable report of it, the marble soon became extensively used in Florence. It was employed in the Pitti Palace for the door-jambs, for the pilasters in the Church of the Sant' Anunziata, and for the decoration of many other buildings and monuments. From Stazzema came the two obelisks in the Piazza di Santa Maria Novella; and Cosimo I ordered an immense column of it, which, unfortunately, was broken before it left the quarry.

There is also another variegated marble found at Stazzema and called Africano[1] di Stazzema. This is a breccia of white fragments and reddish purple cement, and served in the decoration of the Medici Chapel in San Lorenzo.

[1] African, from its dark colours.

Material from Stazzema was also employed by Louis XIV in the Palace of Versailles.

The marbles of Serravezza are the statuary variety, the ordinary white, and various 'Bardigli' or grey-blue marbles.

Santini, Professor of the Accademia di Belle Arti of Pietrasanta, believes that the 'Bardiglio' of Serravezza was employed for the two Bacchanti found near the ruins of the Villa of Quintilius, now in the Palazzo Torlonia, and for several other objects dating from the time of Antoninus in the Vatican Museum, which leads us to believe that the quarries of Serravezza were known to the Romans. Some of the quarries we know were worked as early as 1353. Pope Leo X, who had already sent Michelangelo to Carrara to obtain material for his work, on hearing of the existence of marble at Monte Altissimo in the territory of the Grand duchy, wrote to Michelangelo, commanding him to go thither. As Vasari relates, 'while Michelangelo was at Carrara, where he was causing marbles to be excavated for the tomb of Pope Julius, which he proposed ultimately to complete, as well as for the façade of San Lorenzo, he received from Pope Leo a letter to the effect that there were marbles of equal beauty and excellence to those of Carrara to be had in the Florentine dominions, at Serravezza namely, called Monte Altissimo. Now Michelangelo was already aware of that circumstance; but it seems that he would not attend to it, perhaps because he was the friend of the Marchese Alberigo, Lord of Carrara, or it might have been because he thought the great distance to be passed over would cause loss of time, as indeed it did. He was nevertheless compelled to go to Serravezza; although protesting that the difficulty and expense would be greatly increased thereby, as proved to be

the case in the beginning. But the Pope would not hear a word of objection. A road had to be constructed for many miles through the mountains, and for this rocks were to be hewn away, while it was needful to drive piles in marshy places, many of which intervened. Michelangelo lost several years in fulfilling the Pope's desire; but finally he procured five[1] columns of fine proportion from these quarries, one of them now in the Piazza of San Lorenzo, in Florence.'[2]

This proceeding made the Marchese Alberigo Michelangelo's enemy for life. The Marchese looked with jealous eyes at the opening of the Serravezza quarries, as he derived a considerable revenue from those of Carrara. On this account, every possible obstacle was thrown in the way of Michelangelo, and the Carrarese workmen were greatly excited against him.[2]

Michelangelo spent many years at Serravezza; and later Vasari and John of Bologna were also sent to superintend the work.

After the death of the Medici the quarries were abandoned until the last half of the eighteenth century. John of Bologna's statue of 'Florence Victorious' is of marble from Monte Altissimo, which also furnished 197 tons for the new façade of the Duomo at Florence. Two of the Serravezza quarries furnished 100,000 cubic palms (1450 c. m.) of white marble for the Cathedral of St. Isaac's at St. Petersburg.

The marble product of the communes of Serravezza,

[1] Six columns were taken from the quarries at Serravezza, four were broken en route, one is at La Vincarella, and one in Florence. See Vasari, *op. cit.*

[2] Vasari, *op. cit.*

Pietrasanta, and Stazzema amounted to 45,000 tons in 1872, valued at 28,000,000 lire.

During the Middle Ages a fair amount of marble was used; but it was not until the rule of the early Medici that the quarries of Carrara began to show any considerable development. After this period quarrying again declined, although the trade in paving marbles continued to flourish. In the middle of the sixteenth century Carlo I, Cibo Malaspina, prince of Carrara, drew up a contract giving the right to acquire 800,000 squares of paving marble to a Dutch company. It was only in the middle of the eighteenth century that the trade revived, to be again almost destroyed during the Napoleonic wars. Since then, however, it has increased rapidly, and is still increasing each year. J. A. Smith says: 'The product of the Italian quarries is known and recognized wherever marble is used as embodying all that is best and most desirable in the material. In colour, texture, durability, economy in working, soundness and capability of receiving the highest finish, it cannot be surpassed and is rarely equalled. The so-called Carrara district, embracing the communes of Carrara, Massa, Pietrasanta, Serravezza, Stazzema, and Arni, is the centre of this industry. Carrara and Massa are the two most important, the former having a population in the city itself of 21,000 people with an additional 21,000 in the mountain villages surrounding it and forming part of the commune. These villages are inhabited almost entirely by the quarrymen and labouring class. The commune of Massa has a population of about 24,000.

'Broadly speaking, the entire male population is actively engaged in some branch of the marble industry.

'There are at present in the district 611 quarries

in active operation, of which 345 are at Carrara, fifty at Massa, and the balance distributed among the places named above. In addition to these, there are perhaps double this number which have been opened and afterwards abandoned as being unproductive, or in which for various reasons active work has for the time being ceased. Under the ancient laws, the mountains where the quarries are found are the property of the district in which they are located. Applications for leases are made to the syndic of the town, and within a reasonable time after survey, &c., the concession is granted. The concession is permanent, the only conditions being that the grantee should formally renew it every thirty years, pay the annual rent, and work the property.

'The rent is merely nominal, some quarries producing hundreds of tons annually paying but nine or twelve shillings.

'Failure to pay this for two successive years, or to develop the property in the same length of time, renders the concession void.

'Quarries thus leased may be sold or transferred, or left as an inheritance by the grantee at any time, without formal permission from the grantor.'

Then Mr. Smith speaks of the means of transportation, quarrying and handling:—'The number of workmen for the year 1899 was as follows: For Carrara and Massa, 7,622. Rate of wages for quarrymen, mill men, cutters, polishers, carvers and sculptors, from 1*s.* 7*d.* to 8*s.* per day, and cost of cubic foot of marble from 4 to 40 lire according to quality, colour, &c.

'Total shipment for 1899 was 1,615,579 tons, valued at £5,476,500; 20 per cent. goes to America, 15 per cent. to England and colonies, and 20 per cent. to Italy.' J. A. Smith states that some new and

very beautiful marbles have been discovered near the village of Gragnana and Castelpoggio, north of Carrara. In the vicinity of the Castelpoggio a very fine red marble is found, and some varieties of the well-known black and gold marble are quarried at Monte d'Arni, and Foce near Carrara; also onyx marble at Monte d'Arni.[1]

Carrara, the greatest centre of marble commerce in the world, with its inexhaustible supplies of material unequalled in variety or colour, texture and beauty, stands alone in its position, as it has done for many hundreds of years, and promises to do in the centuries to come.

ISLAND OF ELBA

Granite

A white granite, consisting chiefly of white or whitish felspar, small scales of brown mica and grains of translucent quartz, constitutes the upper part of Monte Capanna near Marciana Marina on the island of Elba. Various geologists, including Lotti, believe this granite to be of the Tertiary system.[2]

The granite of Elba, as well as that of the island of the Giglio, was known to the Romans, and employed by them to some extent in Rome. It was used for the columns of the portico of the Pantheon. These columns are 1·49 m. in diameter, and 11·65 m. in length.[2] The Pantheon, as may be concluded from the inscription, was dedicated by Marcus Agrippa about 27 B.C., which shows that the granite was worked from a very early period.

[1] *Consular Reports*, vol lxv, No. 246, March, 1901. *The Carrara Marble Industry*, by James A. Smith, Consul, Leghorn.

[2] Jervis, *op. cit.*

The Roman quarry was at Seccheto, near the sea, at the foot of Monte Capanna, and in 1859 Jervis saw there several ancient columns lying in the quarry, roughly hewn out.

The Pisans made great use of this stone during the Republic; and three of the eight large granite columns of the Baptistery of Pisa came from Elba in 1159. In 1564 four columns of this stone were used in the construction of the Porta Pia in Rome.[1]

The tribune of the Duomo of Ravenna was made of one piece of Elban granite of extraordinary dimensions.

The Grand-duke Cosimo had a huge basin of this material brought from Elba, which is now in the garden of the Pitti Palace. In the interior of the Milan Cathedral, on either side of the main porch, are two huge monolithic columns of Elban granite.

[1] Jervis, *op. cit.*

STONE FROM ALGERIA AND TUNIS

Marmor Numidicum, Marmor Libicum, Giallo Antico [1]

'THIS country produces nothing remarkable except its marble and wild beasts.' [2]

Thus Pliny alludes to Numidia, the home of the justly famed marble so much beloved by the Romans, which stands alone even to-day as the most beautiful of yellow marbles, so rich and deep are its colours, and so exquisite its compact texture, thus assuring a fine polish. Papinius Statius was indeed justified in saying, 'the yellow stones of Numidia are resplendent.' [3]

This marble varies in colour from the faintest straw tint to deep shades of rich yellow, usually broken by a few thin veins of purple, brown or yellow, slightly darker than the ground-mass.

These might almost be called monochrome, and are known to the Italian stonecutter as Giallo Antico; when heat is applied to them they become flesh-coloured, and are called Giallo Carnagione.[4]

Besides these are the brecciated [5] varieties, of many shades of yellow, brecciated with golden brown, yellow and white, and known as Giallo Brecciato.

[1] Antique yellow.
[2] Pliny, *op. cit.*, Book v, chaps. 2–3.
[3] Corsi, *op. cit.*
[4] Flesh-coloured yellow.
[5] From *breccia*, the Italian for breach, referring to the fact that the marble was broken and fractured and then cemented together again.

The most striking of the 'Numidian' marbles is the Breccia Sanguigna,[1] a startling combination of reds and yellows of deep shades, brecciated and confused, producing a handsome but somewhat gaudy effect. This marble is quarried to some extent to-day and known also as Rouge Etrusque.

The name 'Numidian' is incorrect, as the localities where the Romans obtained the stone were in the ancient provinces of Mauritania and Africa,[2] and not in Numidia, although very near to it.

Most of this material employed in Rome came from Simittu Colonia, the modern Chemtou, in the valley of the Medjerda, Tunis, where the quarries are once more being worked, after being abandoned for many hundreds of years. This locality was not far from the eastern boundary of Numidia (hence the mistake in regard to the name of the marble); and Hadrian on his first visit to Africa (about A. D. 128–129) constructed a road from the quarries to Tebarca, whence the stone was shipped to Rome.[2]

The so-called 'Numidian' marble was also found near Kleber, in the province of Oran, Algeria; but the varieties from this locality are not so frequently seen in Rome.

Near the above named locality is the mountain Djebel-er-Roos (mountain of the capes), commonly known as Montagne Grise, from its grey and arid appearance.

On its summit is an elevated plateau on which the quarries are situated. The soil, where any exists, is of a deep red colour, and traces of iron are to be seen

[1] Blood-coloured breccia.

[2] See paper on the *Rediscovery of the Lost Numidian Marbles in Algeria and Tunis*, by Lieut.-Col. R. L. Playfair. Read to the British Association (Geol. Sect.) at Aberdeen, Sept., 1885.

everywhere. The original colour of the rock was creamy-white, and in one place it retains its natural hue only slightly mellowed by the presence of a small amount of iron, producing an ivory tint. This is perhaps the variety to which Pliny referred as the most livid and the best esteemed. Near this stone, according to Playfair, is a beautiful rose-coloured variety which is capable of being worked both in large masses and in the finest ornamentation. The other side of the mountain has been crushed by pressure into fragments of varying sizes, which have been cemented together, thus forming innumerable beautiful breccias. The fragments are of rose or yellow tints, and the deep reds and browns of the cement are due to the presence of metallic oxides. Besides these there is a Cipollino of exceptional beauty, the well-known Giallo Antico, a deep red species somewhat brecciated, and a purple variety called 'Pavonazzo', which Mr. Ruskin said was nearly the 'loveliest' and the 'most instructive' marble he had ever seen.

What a joy the discovery of this wealth of splendid decorative material must have been to the Romans, who were ever in search of new and beautiful stones with which to embellish their city! Signor Boni is led to believe, from pieces of Giallo Antico found in the sacrificial or expiatory stratification under the Niger Lapis, that this marble was brought to Rome as early as 200 B.C. John Dennie tells us that it was first employed in conjunction with Africano, Porta Santa and Pavonazzetto in the Julian Basilica, begun by Caesar.[1]

However, Pliny who, although he severely censured the use of marble, left us much valuable information

[1] Dennie, *op. cit.*

concerning its history and use, says: 'M. Lepidus, who was consul with Q. Catulus, was the first to have the lintels of his house of Numidian marble, a thing for which he was greatly censured; he was consul in the year of Rome 676 (about 78 B. C.). This is the earliest instance I can find of the introduction of Numidian marble; not in the form of pillars . . . but in blocks, and that, too, for the comparatively ignoble purpose of making the thresholds of doors.'[1]

From Suetonius we know that the first column of this marble brought to Rome was erected in the Forum in honour of Caesar[2]—the same marble which Sidonius Apollinarius compares to 'old ivory yellowed by time'.[3]

That these quarries of Simittu Colonia were imperial property, like most of those of the more beautiful and desirable marbles, is clearly proved by various inscriptions found on the spot. One, of the time of Trajan, shows that they were placed under the superintendence of a slave of the Emperor; others bear the Christian monogram, proving that they were worked down to a comparatively late period.[4]

From an inscription found in Rome we learn that Hadrian ornamented his villas at Tivoli and Antium with this stone. Also he gave twenty 'Numidian' columns to the Gymnasium of Smyrna,[5] and Pausanias says: 'There is also a gymnasium named after Hadrian (at Athens), it, too, has 100 columns from the quarries of Libya.'[6]

Three inscriptions of the time of M. Aurelius state that new quarries were opened at that time

[1] Pliny, *op. cit.*, Book xxxvi, chap. 8. [2] Bruzza, *op. cit.*
[3] Corsi, *op. cit.* [4] Playfair, *op. cit.* [5] Bruzza, *op. cit.*
[6] Pausanias, *Description of Greece*, Attica, Book i. 18 (trans. J. G. Frazer).

and called after him Aurelian. Again, a lead medal was discovered in a column on the Caelian Hill with the heads of M. Aurelius and L. Verus, named together as the proprietors of those quarries.[1] Many inscriptions bear the names of the procurators and officials of the quarries of these marbles, which were described by Paulus Silentiarius as 'those that the Libyan sun pouring down his golden rays tinges with hues of saffron and of gold'.[2]

The numbers on blocks found in the Emporium and elsewhere in Rome run up to 2043 and 3298, thus giving us an idea of the quantities brought to Rome. From Vospicus we learn that Tacitus alone gave 100 columns, each 23 feet long, to the Ostienesi.[1]

Seneca notes that these yellow marbles were used, with those of Alexandria, for mosaic pavements[3] and other finer decorative arts, and, from the notices left us, we can gather that it was used for many other purposes.

As examples of 'Numidian' marble may be mentioned the columns of the Arch of Constantine, of the Pantheon, and of St. John Lateran, and there were fifty-two columns used in the Temple of Apollo on the Palatine.[4]

Corsi enumerated 172 columns in 1825, and not a few have been discovered since his day; and this after nearly two thousand years of destruction and ruin!

The wall panellings of the National Gallery, London, are of this marble, which is also employed lavishly in the Congressional Library at Washington.

[1] Bruzza, *op. cit.*

[2] Pauli Silentiarii, *Descriptio Sanctae Sophiae.* For the translation of this passage and others from Silentiarius I am indebted to the kindness of Mr. R. B. Townshend.

[3] *Epistles of Seneca*, trans. Thomas Morrell.

[4] Dennie, *op. cit.*

STONE FROM ALGERIA

Marmor Alabastrum. Onyx Marble or Travertine Alabastro Antico. (Baths of Etruscus)

There stones in chequered order putt,
From Phrygian rockes and Libyan cutt,
Contending with Taygetus' greene
Marble for gracefulness are seene;
Fat onyxes there panting sweate,[1]
And flaming Ophites burn with heate.
(Martial, Book vi, Epigram 42, from sixteenth-century MS., Bohn).

A FEW words of explanation concerning the geological character of this stone must be given before the details with regard to its usage by the ancients.

This crystalline marble is of aqueous origin, being deposited from water carrying carbonate of lime in solution; and there are two distinct varieties. The first is formed in caves, a cold water deposit, giving rise to stalactites and stalagmites; the second is a hot spring deposit, forming beds. Travertine is the name most frequently given to the porous and less marble-like spring deposit; oriental alabaster to the cave variety, and both are included under the term onyx marble.[2]

The cave variety is usually of duller colours, coarser texture, cavities often being present, and repeatedly shows a zonal structure due to its mode of formation.

The various names of onyx marble, including

[1] Having a dewy appearance, but in reality dry.
[2] *Stones for Building and Decoration*, by George P. Merrill.

alabaster, are all misleading.[1] The Romans knew it originally as Lapis Onychites, from the Greek word for nail, but later this term was also applied to the gem onyx, a siliceous stone then unclassified, to which this name was given (as also to the marble) on account of the resemblance of its layers and tints to the shades in the finger-nail of a 'well-bred person' (to cite Epiphanius).

According to the Greek legend, the origin of the onyx was due to Cupid's having cut the nails of the sleeping Venus with his arrow; these, falling into the Indus, were changed to onyx.[2]

Later, the term onyx was restricted to the gem or ornamental stone; and the onyx marble lost its ancient title and became known as alabastrites, from the fact that it was used for making alabastra, or perfume jars, shaped like minute amphorae, but without handles, as their Greek appellation signifies.

Such alabastra were of various materials, but chiefly of onyx marble.[3]

Pliny mentions an Egyptian town called Alabastra, where the vessels were to a large extent made. In order to extract the contents, the slender necks of these jars were so made as to be easily broken off; which explains the passage in the New Testament where it is said that the alabaster box (or jar) was broken. These jars contained perfumed oils, or ointments, which were closely sealed down in order to insure their preservation. Leonardus tells us that this stone (onyx marble) was best for vessels to hold unguents, which are preserved in them

[1] *Onyx Marbles*, by George P. Merrill: *Report of U. S. National Museum*, 1893.

[2] *Catalogue of Gems*, by Wirt Tassin: *Report of National Museum, Washington*, July, 1900.

[3] *Natural History of Gems and Decorative Stones*, by C. W. King.

without spoiling.[1] Pliny says, 'This stone is called alabastrites by some, and is hollowed out into vessels for holding unguents, it having the reputation of preserving them from corruption better than anything else.'[2]

The large alabastra from Pompeii, now in the Museo Borbonico, still diffuse a strong odour of their contents, which confirms this reputation; whereat the Emperor Nicolas, on his visit there, 'rimase sorpreso' (so the custode used to relate), and not without reason.[3]

The term alabastra, first given to the vessel itself, later became the name of the material of which it was made; hence our modern word alabaster, which at present signifies an entirely different rock, a sulphate of lime, resembling the onyx marble in its translucency.

These two rocks, frequently confused by the ancients, are still mistaken for one another to-day, but the true alabaster or sulphate of lime can be readily distinguished by its greater softness, being easily scratched by the finger-nail.

The Egyptians quarried onyx marbles both in Egypt and Algeria from the earliest times, and after them the Romans, as usual, were quick to appreciate their beauty and value as decorative material.

The onyx marbles quarried in Algeria were those of the hot spring variety, thus differing from the Egyptian; and in 1849 a Frenchman, M. Delmonte, was fortunate enough to rediscover the ancient quarries amongst the Tertiary limestones of 'Blad Recam' (marble country).[4] Here, in the northern part of Algeria, in the province of Oran, were the

[1] Wirt Tassin, *op. cit.*
[2] Pliny, *op. cit.*, Book xxxvi, chap. 12.
[3] King, *op. cit.*
[4] Hull, *op. cit.*

ancient quarries that supplied Rome and Carthage with that fine translucent marble. Dr. Merrill says, 'The stone varies in colour from pure white to a rose tint, and bright red, golden yellow, and more rarely green. The ribboned or veined onyx is abundant. The ribbons are parallel with the plane of deposition and of a clear deep yellow, sometimes rose or violet tint.'

The quarries are at present worked, and this beautiful material is again in the market.

STONE FROM EGYPT

Marmor Alabastrum, Onyx Marble, Alabastro Antico

THE name of this stone and its geological characteristics have already been explained, and it is only necessary to repeat that the Egyptian onyx marbles are of the cave deposit variety, forming the well-known stalactites and stalagmites.

From prehistoric times onyx marbles were employed in Egypt for bowls, vases, urns, jugs, perfume vessels, and for the interior decoration of tombs and temples. Dr. Merrill believes that they were thus used as early as the Second Dynasty, which Professor Lepsius fixes at 3639 B.C., and M. Mariette at 4751 B.C.

Vast numbers of canopi, or canopic vases, were made in this material. These were of a special type, with tops in the form of heads of human beings or divinities, used for holding the bodies of the dead. They were made in large numbers at Canopus, whence their name.

These various objects of Egyptian 'alabaster' were highly valued, and exported at a very early period. It is stated that 'the names of Persian monarchs have been found in hieroglyphics and cuneiform characters upon them, whilst vases, apparently of Egyptian material if not of Egyptian fabric, have been discovered in the early tombs of Asia Minor and Greece, and the isles of the Archipelago'.[1]

According to other authorities, the first mention

[1] Merrill, *op. cit.*

of articles of this nature by Greek writers is that of Herodotus (born 484 B.C.), who speaks of an 'alabaster vessel' as one of the presents sent by Cambyses to the Ethiopian king.[1]

Dr. Dawson says the magnificent granite temple of Kephren at Gizeh was lined with this stone in the early age of the pyramid-building kings.

The materials in the temple of the Sphinx in Egypt are rose granite and 'alabaster'; the supporting piers are of granite, and the lining slabs of the walls and the ceilings of 'alabaster' without carving or any form of relief.[2]

The Romans after the Egyptians made great use of the onyx marbles of Egypt, which when first brought to Rome were considered exceedingly valuable; some amphorae carved in onyx marble as large as the Chian wine vessels, which were exhibited by P. Lentulus Spinther, were regarded, says Cornelius Nepos, as wonderful curiosities, and 'yet five years later', he adds, 'I saw columns of this material no less than two and thirty feet in height.' Pliny in referring to this passage writes: 'At a more recent period again, some change took place with reference to this stone; for four small pillars of it were erected by Cornelius Balbus in his theatre, as something quite marvellous: and I myself have seen thirty columns of larger size in the banqueting-room which Callistus erected, the freedman of Claudius, so well known for the influence he possessed.'[3]

The onyx marbles of Egypt enjoy the greatest fame of any stone employed in ancient times, and the various notices of them left us by the ancient writers would fill pages. It is only necessary to mention the names of Martial, Lucan, Cornelius Nepos, Herodotus,

[1] Herodotus, Book iii. 20 (trans. G. C. Macaulay).
[2] Merrill, *op. cit.* [3] Pliny, *op. cit.*, Book xxxvi, chap. 12.

Marcellus, Horace, Propertius, Petronius, Julius Capitolinus and Salmasius in order to show their celebrity and importance.

Dioscorides and many other doctors accounted 'alabaster' good in physic, and he who carried it was supposed to be victorious in suits at law.

There are two well-known localities[1] in Egypt where this marble was worked. One is near Beni-Souef (some twenty-five leagues south of Cairo), at Gebel Oorakem (Wady Sanoor), where the Viceroy Mehemet-Ali extracted the 'alabaster' for the decoration of the mosque at Cairo, and also the beautiful monolithic columns which he presented to St. Paul's-outside-the-Walls at Rome, forty feet long, and each of a single block of the most exquisite quality.[2] The stone from this locality is of a faint straw colour or nearly white, and of a granular texture. The other variety is found at Syout, further to the south but also in the Nile valley; and Delesse and Château[3] both state that it was discovered by Selim-Pacha, to whom the Viceroy conceded it.

According to Boscawen[1] these quarries were worked by kings of the Sixth Dynasty (3703 B.C., Mariette; and 2744 B.C., Lepsius); and he gives a vivid description of his visit to them. From inscriptions of various dynasties found there, he came to the conclusion that the quarries were not worked later than the Eleventh Dynasty.

Boscawen also refers to another quarry of great antiquity situated to the east of the Tel-el-Amarna plain, behind the northern tombs. 'This was worked by Rameses II and his son Meneptah, the Pharaohs

[1] Merrill, *op. cit.* [2] King, *op. cit.*
[3] Château, *Téchnologie du Bâtiment*; Delesse, *Materiaux de Construction de l'Exposition Universelle de* 1855.

of the Oppression and the Exodus, and its steep sides may have echoed to the blows of the picks of the toiling Israelites.' [1]

According to Dr. Merrill, 'The Syout stone differs from the Beni-Souef in having a micro-radiating instead of a granular texture, and in being of a light yellowish or straw colour. It is translucent and close in texture, and has a beautiful mellow and pleasing tint when either carved or polished.' It also shows cloudy undulations of a graceful effect. The Romans esteemed above all the opaque varieties with the circular concretions.

'The valley of the Nile, north of Keneh,' says Mr. Brindley, 'abounds in these caves of marble, the colours being white and honey tintings, with deeper yellows and browns.'

This stalagmitic deposit is derived in part from the crevices and pockets in the Eocene limestones of the Nile valley.[2]

Every museum of Egyptian antiquities contains objects made in these stones; but perhaps the most marvellous example is that of the magnificent sarcophagus of Seti I, father of Rameses II (Mariette, 1462 B.C.; Lepsius, 1443 B.C.), found in his tomb in the 'Valley of the Kings' by Belzoni, and now in the Sir John Soane Museum, London. This sarcophagus is nine feet four inches in length, three feet eight inches wide, and from two feet eight inches to two feet three inches deep. It is hollowed out of a single block so delicately that its general thickness is only two and a half inches; and a lamp placed within shines through its translucent sides.

[1] Merrill, *op. cit.*

[2] *Rocks, Rock weathering, and Soils*, by George P. Merrill, page 113.

Conglomerate-breccia of Egypt, Breccia Verde d'Egitto

A conglomerate is composed of rounded fragments of rock cemented together.

If the fragments are angular the rock is called a breccia.[1] When the stone is composed of both angular and rounded fragments it is called a conglomerate-breccia or breccia-conglomerate. Conglomerates differ from sandstones only in the increased size of their grains.[2]

The green conglomerate-breccia of Egypt, also known as Universal Breccia,[3] although so frequently employed by the Egyptians and later by the Romans, seems to have been sadly neglected by the ancient writers, not one of whom alludes to it.

This stone is extremely handsome, and unique in appearance; it contains fragments of greenstone, gneiss, porphyry, slate, serpentine and marble. The ground-mass and predominating colour is green in every shade, varied with fragments of red, purple and black.

The rock is found near Hammarmat in Egypt, and lies on slate in conformable thick bedded strata.[4] The hieroglyphics and chisel marks of the ancient Egyptians are to be seen sharp and legible to-day, notwithstanding the hundreds of years that have passed since the quarry was worked.

According to Baron and Hume[5] the working of

[1] From the Italian for breach, referring to the fact that the stone was broken or fractured and then cemented together again.

[2] Merrill, *op. cit.*

[3] Because it contains fragments of so many varieties of rock.

[4] On the Qena-Qosseir road.

[5] *Topography and Geology of the Eastern Desert of Egypt*, by Baron and Hume.

this stone was by no means limited to this neighbourhood, it having been noted at the mouth of Wadi Dib, and being also splendidly developed in the region to the west of Jebels Dara and Mongul in the El Urf chain. The Breccia Verde has also been found in eastern Sinai, in one case crowning the summit of the Ferani range, at over 1500 m. above sea-level, which is a further evidence of the close connexion existing between the mountain ranges now separated by the Suez depression.

This stone is found in the excavations of Rome; and the churches of Italy and the mosques of Constantinople contain numerous examples. The celebrated Sarcophagus supposed to have contained the body of Alexander the Great may also be mentioned as an instance of the employment of Breccia Verde d'Egitto. This tomb is now in the British Museum. There are also examples in the Louvre, and a vase in the Villa Albani at Rome.

Lapis Porphyrites, Lapis Thebaicus, Lapis Leptospsephos, Lapis Romanus, Red Porphyry, Porfido Rosso Antico

'Porphyrites, which is another production of Egypt, is of a red colour: the kind that is mottled with white blotches is known as "leptospsephos". The quarries there are able to furnish blocks of any dimensions, however large. Vitrasius Pollio, who was steward in Egypt for the Emperor Claudius, brought to Rome from Egypt some statues made of this stone; a novelty which was not very highly approved of, as no one has since followed his example.'[1]

[1] Pliny, *op. cit.*, Book xxxvi, chap. 2.

This stone is a diorite or andesite, a plutonic rock consisting of plagioclase felspar and hornblende. The ground-mass is compact, and in it the felspar crystals are porphyritically developed. The ground is of a dark purplish red, spotted with numerous small white, or pinkish white crystals. There are also two other ancient varieties not quite so common; one with a dark green ground-mass, and greenish white crystals, and the other black with whitish crystals[1]; all three were used by the ancients, and came from Egypt. There are stated to be two distinct varieties of the red, one of which is brecciated. It scarcely seems necessary to give any description of these handsome stones, as they are so well known throughout Europe; and hardly a gallery or museum can be visited that does not abound in examples of them or, more correctly speaking, of the red variety, for the other two species are rare.

The name 'porphyry', by which this stone is best known, is derived from the Latin *porpora* (purple), referring to its colour.

In modern geology the word is used only adjectively, as descriptive of a certain rock structure which is characteristic of the ancient 'porphyry'. When the ground-mass of a stone is fine, and large-sized crystals are developed in it, the structure is known as porphyritic, and the crystals are said to be porphyritically developed.

Formerly the name was given to a certain group of rocks having characteristics in common with the ancient 'porphyry'; at the present time the terms 'quartz porphyry' and 'felspar porphyry' are given to rocks having the structure described above, and quartz or felspar as the predominant mineral.

[1] Mr. Brindley found these varieties in the same locality with the red.

This celebrated and imperial stone was known by various titles to the ancients; its most common name among the Romans being Lapis Porphyrites. Lucan alludes to it as 'Stone of Purple'; again, it was called 'Theban Stone', 'for,' says Eusebius of Caesarea, 'there were large quarries of it in the Thebaid.' When the stone became so extensively employed in Rome it acquired the name of 'Stone of Rome', by which it was most frequently known to the Byzantine writers. Codinus mentions a letter of the widow Marcia's, notifying the Emperor Justinian that she had sent him 'eight Roman columns' for the decoration of St. Sophia. These columns of 'porphyry' were taken from the Temple of the Sun, which Valerian had built in Rome. Again, Constantine Porphyogennetus, in speaking of a vase, said it was made of Egyptian stone, 'or what we now call Roman Stone,' and (as a third instance) Cedrenus says that Constantine the Great was buried in a tomb 'of porphyry or Roman Stone'.[1] From Pliny[2] we learn that this stone was brought to Rome during the reign of Claudius (b. 10 B.C., d. A.D. 54); and, as far as can be ascertained, this was its first appearance in Rome. Mr. Brindley says that the sarcophagus of Nero (d. A.D. 68) was the first mentioned. John Dennie tells us that the oldest 'porphyry' remaining to us is the magnificent basin of the Vatican Rotonda, found on the Esquiline in the sixteenth century, and belonged very probably first to Nero, although it is usually attributed to the Baths of Titus.[3] Nibby tells us that, dating from the time of Hadrian (b. A.D. 76, d. A.D. 138), who gave twenty columns alone of it to the Gymnasium of Smyrna, the stone became

[1] Corsi, *op. cit.*

[2] Pliny, *op. cit.*, Book xxxvi, chap. 2.

[3] Dennie, *op. cit.*

exceedingly common in Rome; but he only gives, as examples of certain date, the columns of the little chapels in the interior of the Pantheon, and the large urn in the portico, which, he says, are of the time of Septimius Severus (b. A.D. 146, d. A.D. 211).[1]

The quarries of this handsome and valued stone were discovered during the reign of the Emperor Claudius; and the locality where they were situated was known as Claudian Mount; Claudius Ptolemaeus, who flourished about A.D. 140, called it Mons Porphyrites.

Here at Djeebel-Dokhan, fifty-five miles from the grey granite of Djeebel-Fateereh, under the care of the same procurator, are many traces of former work and occupation. Aristides, in his oration written about 147–8, under Antoninus Pius, attests that a number of the 'condemned' toiled here; most of whom, during the time of Diocletian, were Christians according to Eusebius.[2]

According to Baron and Hume[3] the quarries, always imperial property, were most actively worked during the reigns of Nero, Trajan and Hadrian, during the first two centuries of the Christian era; 'and these are still in as perfect condition as when abandoned by those who worked them, but it is doubtful whether under present conditions they would be worth reopening, though the Red Sea is within comparatively easy reach.

'The principal locality is in a basin-like valley, surrounded by the high summits of the Dokan range; a steep road, still in fairly good preservation, leading from the ruined temple up one of the western slopes. The quarry itself is nearly at the summit of the hill, the purple porphyry forming vertical walls (due to

[1] Bruzza, *op. cit.* [2] Ibid.
[3] Baron and Hume, *op. cit.*

quarrying) some twenty-five metres high, and being in intimate connexion with the dark andesite with small white crystals (itself a fine looking rock)[1] and a brick-red felsite. There are other occurrences of the porphyry in Jebel Esh and El Urf.'

W. Brindley, after giving an account of his visit to these mines, states in a note: 'These porphyry quarries, after having been lost sight of for 1,500 years, and having lain dormant for probably 1,700 years, are once again to be worked. The Romans carried their blocks to the Nile—a distance of ninety-six miles; but now that there is a direct route through the Suez canal they will be taken to the ancient port of Myos Hormos, on the Red Sea. This route being a gentle incline, and the distance a little more than twenty miles, cheap sea transit from this port will now enable this valuable material to be obtained in Europe and America in large sizes at a reasonable price; and by improved machinery the cost of working will be reduced nearly to that of granite.' 'This sanguine forecast,' adds Baron and Hume, 'has not been fulfilled up to the present time, owing to the difficulties of transport and water-supply, as the quarries were not being worked when visited in 1898. At the same time, the rock is present in large quantities, and only requires favourable economic conditions to again take rank among the leading ornamental stones of the world. Both Brindley and Schneider give beautiful photographic reproductions of monuments in which the stone has been especially employed, and the great cathedrals of Italy contain a fine series of examples, such also having been noted by Hume, in the Duomo and Museum at Naples, in Venice and at Constantinople, while Schneider has

[1] Perhaps the so-called 'Porfido Verde Antico', or 'ancient green porphyry'.

brought together the most detailed information as to its occurrence and use. It is, in the writers' opinion, in the main an andesite containing withamite having a crystalline matrix of a brownish-red to purple colour, through which are scattered innumerable small white lath-shaped crystals of plagioclase felspar.'

The following is an abstract from a paper read by Mr. Brindley before the British Institute of Architecture, November 20, 1887, on the 'Red or Imperial Porphyry of Egypt':—

'The ancient Egyptians appeared never to have discovered their most beautiful stones; this was done by the Romans, whose men of science did not neglect even places most difficult of access. For example, a noble red purple stone was found on the summit of a desolate mountain, 4,000 feet high and 100 miles from habitations.

'A colony was established of thousands of workmen, who received their provisions from the Nile, stations being built, wells sunk, and huts erected on the route. This route Mr. Brindley and his wife journeyed over on camels from Keneh thirteen days, in order to visit the quarries. The quarries are on Mount Gebel Duchar (mountain of smoke), which rises abruptly out of the plain in the shape of a long horse-shoe; the valley between containing a small town, wells, reservoirs, with a temple in pink granite of small dimensions. In addition to many ordinary roads and foot-paths there exists the remains of two grand block roads, with piers at the side for lowering stupendous blocks by means of ropes. The porphyry is in masses some 120 feet wide (many of the choicest varieties are in masses 16 feet wide), and appears to have been upheaved through a mass of granite and black shaley trap rock, the granite being burnt

apparently through the heat of the porphyry. The whole mass appears of fairly uniform texture, but some of the obtrusive parts are very different, being volcanic worn masses of variously tinted porphyry boulders, embedded in a purple felsite paste. This gloriously coloured stone was the only one in the scale of colours the Romans lacked, and it never became a commercial material, having been imperial from the first, and worked only by and for the state. There still exists about three hundred monolithic porphyry pillars in Europe, and the stone is to be found in Asia as far as Baalbec and Palmyra. In all cases it still retains its freshness of colour, proving beyond a doubt its durability.

'A room named the "Porphyrea" in the Imperial Palace at Constantinople was lined with porphyry brought from Rome by Constantine; and in the reception hall of that palace there was a large porphyry slab under a baldacchino on which the Emperor stood at great festivals. What with Christian conquerors and the Doge Dandelo little now remains. The most important monument erected by Constantine was the column 100 feet high, built with eight cylindrical pieces, each 11 feet long; and this is still standing, though damaged by fire and earthquake.

'According to Dr. Schneider, Prince Charles of Prussia formed the most famous collection of ancient porphyry works of art, including a colossal statue of Minerva, and a grand pavement of Opus Alexandrium brought from Ravenna.'

The ancients made use of 'porphyry' in many and various ways. It was especially valued by the Romans for sarcophagi; and was also largely employed for columns, labra for the baths, and urns, one of which Septimius Severus is said to have had

with him in England,[1] and in which he intended to have his ashes deposited. The bodies of Julian the Apostate, Maximilian Hercules and Valentian II (according to St. Ambrose) were all placed in 'porphyry' urns;[1] as also that of Otho II, who died in Rome during the tenth century.

Some of the columns in a single piece of 42 feet long are still fulfilling their original destiny in the portico of Constantine's Baptistery at Rome, and in the Mosque of St. Sophia.[2] Silentiarius in his description of the latter says, 'And many stones there stand out and shine; star spangled porphyritic stones, which once loaded down with their weight the river barges of the mighty Nile.'[3]

Dennie says that probably the largest column ever seen was the one which the Emperor Constantine erected in his new capital on the Bosporus, but very possibly this may have been brought from Rome. It was 100 feet high, and made of nine solid drums, each 11 feet in height, with joints covered with annulets of laurel wreaths in gilt bronze. This had a diameter of 11 feet. It has been estimated by a person experienced in stone-cutting that the labour of 2,000 men for three years must have been expended on the quarrying and preparing and transportation of any one of the great monoliths which came to Rome.

'Porphyry' was frequently made into plaques for decorating pavements, some of which were of remarkable dimensions; one in St. Peter's, for instance, is 8 feet 6 inches across. There is also a circular basin in the Sala Rotonda of the Vatican Museum 12 feet

[1] See *Catalogue to the Ravestein Collection*, Musée Cinquantenaire, Brussels.
[2] King, *op. cit.*
[3] Silentiarius, *op. cit.*

in diameter, from the Baths of Diocletian.[1] It was often employed for the draperies of imperial busts, the imperial purple of the stone being very suitable; the heads alone were of white marble or bronze.

Some of the works left us by the Romans in 'porphyry' are more than wonderful; both on account of the immense size of the blocks often used and also for the elaborateness of the carving in a material which opposes so stubborn a resistance to the chisel. King[2] says:—

'The art by which the Romans worked these vast masses with such evident facility is entirely lost. At present, when made use of in architectural decoration, the only method of subduing the stone is to steep it for many weeks (as a Roman architect who had had recent occasion to employ the stone states), and even then it speedily turns the edge of the best steel tools. It has therefore been conjectured that the old sculptors worked both this and basalt by means of emery-powder and chisels of soft metal. It is known that the early Egyptians executed their stupendous works in hard stone with bronze chisels, some of which have been found in the quarries.'

The most marvellous works in 'porphyry' we know of are the sarcophagi of the Empress Helena and Constantia, in the Vatican Museum. The former is of a single block 13 feet high by 8 feet long of the deepest colour and finest texture. 'The Triumph of Constantine,' a military procession, is carved on the two fronts. Busts of Helena and Constantine stand out in the highest relief as medallions above. This sarcophagus, first placed in the Mausoleum of Helena (now the Torre Pignattara), was removed to the

[1] Baths of Titus according to some authorities.
[2] King, *op. cit.*

Lateran by Anastatius IV in 1154, to serve for his own tomb, and was placed near the Porta Santa until 1600, when, being moved in the course of alterations of that Basilica, it fell to pieces. Pius VII restored the fragments which had remained in the cloister, and removed it to the Vatican. The restoration and repolishing of this monument occupied many hands continuously during seven years;[1] and the tomb now rests in the Sala a Croce Greca of the Museo Pio-Clementino; where also remains the sarcophagus of Constantia, daughter of Constantine, which is not nearly so elaborate in its decoration; the workmanship is also inferior. This is 7⅓ feet by 5⅓ feet, and was taken from Constantia's tomb, afterwards the Church of Santa Costanza, and is adorned with vintage scenes, perhaps in allusion to the Vineyard of the Lord. On account of these sculptures the tomb was known during the Middle Ages as 'La Tomba di Bacco'. It remained untouched in its original site within the sepulchral chapel of Santa Costanza, until transferred by Pius VI to the Vatican.[2]

In Gothic times 'porphyry' was sawn up into thin plaques for making 'Opus Alexandrium', the then much admired pavement for churches, in imitation of the ancient sectile.

According to Mr. Brindley the plaques of the Royal tombs in Westminster Abbey, and the pavement under Becket's Crown at Canterbury are of this stone, and South Kensington contains beautiful examples in Renaissance and French work, and the British Museum some of the Byzantine period.

[1] King, *op. cit.* Dennie says that twenty-five skilled workmen were employed for twenty-five years at an expense of over $90,000 on the restoration of one of these monuments.

[2] Baedeker, *Central Italy.*

In ancient times this 'porphyry' was used by the painters for grinding colours, and by the doctors for grinding pearls, according to Boetius.[1]

This stone has also been found in the ruins of Pompeii.[2] After Pliny's time a similar rock was discovered in Sardinia which was extensively used.[3]

Lapis Syenites, Lapis Pyrrhopoecilus, Red Granite, Granito Rosso Antico

'In the neighbourhood of Syene, in Thebais, there is a stone found that is known as "Syenites", but was formerly called "Pyrrhopoecilus".'[4]

Granite is an igneous rock, consisting of quartz, a potash felspar, with various other minerals, either mica or hornblende, nearly always being present.

The famous red granite of Egypt was obtained near Assouan, or Ancient Syene, in Upper Egypt, where it occupies large tracts between the first cataract of the Nile and the town of Assouan.[5] Here it was quarried as far back as the reign of Zestus, King of Thebes, 1300 B.C.[6]

The stone is very coarse, and the bright rose pink of the felspar crystals give it its predominating colour.

The grey Egyptian granite is also said to have come from near Syene and to have been found in close connexion with the red. It was also known as Lapis Syenites.

The employment of granite in Egypt was evidently not so extensive as one is generally led to suppose; that is, for building purposes.

[1] Anselmus de Boetius, *Le Parfaict Joaillier.*
[2] Hull, *op. cit.* [3] King, *op. cit.*, and *Century Dictionary.*
[4] Pliny, *op. cit.*, Book xxxvi, chap. 13. [5] Merrill, *op. cit.*
[6] Hull, *op. cit.*

Perrot and Chipiez [1] give us the following account of its usage :—

'People have seen a few granite obelisks in two or three of the European capitals, and they have too often jumped at the conclusion that the Egyptians built almost exclusively in granite. The fact is that there is but one building in Egypt the body of which is of granite; and that is the ancient temple of Gizeh, which is called the Temple of the Sphinx. Even there the roof and the lining of the walls were of alabaster. Granite was employed, as a rule, only where a very choice and expensive material was required.

'It was brought into play when certain parts of a building had to be endowed with more nobility and beauty than the rest.

'Thus, there are in the great Temple of Karnak a few small rooms, called "the granite chambers", in which the material in question has been employed. Elsewhere in the same building it was only used incidentally. In the Pyramid of Cheops the lining of the two "upper chambers" is of granite. In many of the Theban temples it was employed for the bases of columns, thresholds, jambs and lintels of doors. It was also used for isolated objects, such as tabernacles, monolithic statues, obelisks, and sarcophagi. The enormous quantity of granite which Egypt drew from first to last, from the quarries at Syene, was mostly for sculpture.'

After the Egyptians, this granite was used by the Greeks,[2] and subsequently by the Romans, to whom it was known as Lapis Syenites or Lapis Pyrrhopoecilus, the latter name alluding to its fire-like colour.

[1] *Art in Ancient Egypt*, by Perrot et Chipiez (trans. W. Armstrong).

[2] Delesse, *op. cit.*

At the present day the name Syenite is given to a rock essentially different from granite, typically free from quartz.

Letronne[1] would lead us to believe that the Romans did not quarry this stone until the third century of our era. The stone, however, was brought over before then, although perhaps it may be true that it was not quarried by the Romans until later. An inscription on the Antonine Column reads: the ninth year of Trajan, or A.D. 106.[2] Another on the obelisk in Piazza del Popolo reads, 23 B.C., and was brought over by order of Augustus.[3] We know from Pliny that the stone was well known in his time, but of course that does not necessarily mean that the Romans were working the quarries.

The transportation of the granite, of which Corsi enumerates 12 obelisks and 714 columns of the red variety and 1787 of the grey in Rome, from the dry climate of Upper Egypt has not always been successful; in fact, it has been proved that in Upper Egypt alone will the stone remain uninjured for ages, and this only when raised above all contact with the ground.

'The Egyptians evidently knew that whenever their granite was exposed to damp there was danger of decomposition, and they were in the habit of building obelisks or other granite monuments on foundations and substructures of limestone; these being found at the present day perfectly preserved, while the granite above them shows signs of decay in proportion to its contact with the earth subsequently accumulated around it.'[4]

This perhaps may account for the fact that the

[1] Franz Letronne, *Recherches en Égypte.*
[2] Bruzza, *op. cit.* [3] Dennie, *op. cit.*
[4] *Stone*, July, 1903.

Egyptians so seldom used granite as a building stone.

The obelisks of New York, London, and Paris are all of the famous red Egyptian granite, many examples of which are also to be seen in the British Museum.

Lapis Psaronius, Granite of the Forum, Granito del Foro

'Authors, too, have paid some attention to the stones in use for mortars, not only those employed for the trituration of drugs and pigments, but for other purposes as well. In this respect they have given the preference to Etesian stone before all others, and next to that to Thebaic stone, already mentioned as being called "Pyrrhopoecilus" and known as "psaranus" by some.'[1]

From all available information in regard to this granite it seems clear that it was not employed by the Egyptians, nor was it worked by the Romans before the reign of Claudius; hence it was frequently known as 'Claudian Stone'; and Mons Claudianus was the name given to the long tract of land where the quarries were situated. These were some fifty-five miles from the red 'porphyry' at Djeebel-Dokhan. From an inscription we learn that both stones were under the care of the same procurator under Hadrian. During the reign of Trajan, Fons Traianus (now Djeebel Fateereh) was founded in order to work these quarries more conveniently. An interesting inscription was found here of the year A. D. 118, or the second year of Hadrian, with the name of the contractor or procurator of that time.[2]

New quarries were opened and worked under

[1] Pliny, *op. cit.*, Book xxxvi, chap. 43.
[2] Bruzza, *op. cit.*

Septimius Severus about A. D. 207, between Syene and Philae in the Thebaid; which fact we know from an inscription found by Belzoni. The Alexandrine Column is said to have come from these quarries.

This black and white granite, known to the Romans as Lapis Psaronius, from the word 'starling', referring to its spotted appearance, is now called 'Granite of the Forum', on account of its extensive use in Trajan's Forum. The column in the Piazza della Trinità, Florence, is of this stone; as also two columns in the portico of St. Peter's, and the column in Venice on which stands St. Mark and the Lion brought from Tyre by the Doge Michielli in 1127, and the red granite column of St. Theodore and the Crocodile standing next it. Remains of both these stones are still to be seen at Tyre.[1]

Lapis Thebaicus, Speckled Slate, Lavagna Tigrata

'Thebaic stone, which is sprinkled all over with spots like gold, is found in Africa, on the side of it which lies adjacent to Egypt; the small hones which it supplies being peculiarly adapted from their natural properties for grinding the ingredients used in preparations for the eyes.'[2]

Thus Pliny wrote of the Lapis Thebaicus of the Romans, which the Greek physician Dioscorides describes as blackish or brownish;[3] and which is frequently found in Roman excavations.

This stone is a slate; that is, a hardened siliceous clay. It has been altered and splits along a new set of planes usually distinct from those of the original bedding.

[1] Hull, *op. cit.*

[2] Pliny, *op. cit.*, Book xxxvi, chap. 13.

[3] Corsi, *op. cit.*

STONE FROM FRANCE

Marmor Celticum, Black and White Marble of France, Bianco e Nero di Francia

PAULUS SILENTIARIUS speaks of 'the Celtic mount, abounding in crystals, brings forth marbles of a black colour but shot through everywhere with milk white in irregular confusion.'[1]

This marble is in reality brecciated, the black being often in sharp angular fragments; the cement is pure white, and grey sometimes appears. Both the black and white are extremely clear and clean, and the marble takes a good polish.

The ancient quarries of this marble, which were worked by the Romans, were rediscovered in 1844, on the river Lez, near St. Girons and St. Lezier.[2]

There are fine examples of it to be seen in the vestibule of the Hotel Metropole, London, in the chapel of S. Sebastiano, St. Peter's, and also in the choir of Santa Maria Maggiore at Rome.

[1] P. Silentiarius, *op. cit.*

[2] According to Mr. Brindley.

STONE FROM GREECE

Greece, conquered Greece, her conqueror subdued,
And clownish Latium with her arts imbued.[1]

[2] MARBLE was the indispensable material of all architectural work in Greece, and was employed by the greatest of her sculptors for the masterpieces which they finished with their own hands.

At first any soft stone easy to carve, and inferior qualities of marble were used. These were often painted, but when the excellence of some of the exquisite marbles of Greece had been discovered, these came to be used exclusively.

When the first Greek cities fell into Roman hands, Rome began to decorate herself with the spoils of the conquered people. One whole day was given to the triumphal procession of captured statues.

Athens, Olympia and Delphi were pillaged by generals like Sulla without respect to person or place; and, more gradually and quietly, the Roman proconsuls carried off the most celebrated masterpieces of Greek art to add to their own collections, or to embellish the public buildings of Rome, and thus win the favour of the people.

The art and letters of Greece were looked upon as things to be despised or 'at the most patronized

[1] Horace, Book ii, Epist. 1, to Augustus (trans. Sir Theodore Martin).

[2] For the following information see *A Handbook of Greek Sculpture*, by E. A. Gardner.

as an ornamental addition to the luxuries of life'. The sentiment of the average Roman was [1]—

> Leave to the Greek his marble nymphs
> And scrolls of wordy lore.[2]

This at least was the feeling during the earlier Republic, but after many years of stubborn resistance the Romans at last succumbed to the enchanting arts of Greece, which they at first despised, and later affected to despise; and 'at last', as a French writer says, 'they were forced to bow the head beneath the brilliant yoke of luxury; and Greece, industrious, learned and polite, subdued by the admiration which it extorted, the ignorant, unlettered and rude barbarians who had conquered her by force.'

Thus the Romans learnt the art of employing marble for sculpture and decoration; and from Greece and its islands they obtained the stupendous quantity with which they beautified their city, of which such an enormous amount still remains to be seen after two thousand years of plunder and destruction.

Marmor Batthium, Bigio Antico [3]

Although grey marble was used so extensively in Rome, the ancient writers left us no information as to where it was quarried, or by what names it was known.

The only clue we have in regard to its name we owe to Blasius Caryophilus,[4] who said that the two statues of the Dacian kings in the courtyard of the Capitoline Palace were of Marmor Batthium, which the Roman stone-cutters call Bigio Antico.

There are many varieties of the ancient grey

[1] Gardner, *op. cit.*
[2] Macaulay.
[3] Antique grey.
[4] Corsi, *op. cit.*

marble, and it seems probable that for the most part they came from Greece, a number of the ancient quarry sites having been rediscovered and inscriptions found, proving that they had been worked by the Romans.

Hamilton describes the quarries of Teos in Ionia, where the so-called Bigio Brecciato [1] was found, as also in the neighbourhood of Ephesus and Eritrea.[2] From inscriptions copied by Hamilton and Le Bas from blocks in the quarries of Teos we learn that the marble was worked during the time of Marcus Aurelius, the blocks being dated A. D. 163–165–166. A light veined grey marble was quarried at Miletus; a block found in the Roman Emporium bearing the inscription 'Ex Ratione Marmorum Milesiorum'[3]; however, this marble does not correspond to Pliny's description of the marble of Miletus, which he says was black.

Another variety of the ancient grey marble is the Bigio Morato,[4] which Corsi[5] believes to be the famous Lucullan marble of which Pliny says, 'Four years after this Lepidus, L. Lucullus was consul; the same person who gave its name, it is very evident, to the Lucullan marble; for, taking a great fancy to it, he introduced it at Rome. While other kinds of marble are valued for their spots or their colours, this marble is entirely black. It is found on the island of Melos and is pretty nearly the only marble that has taken its name from the person who first introduced it. Among these personages Scaurus, in my opinion, was the first to build a theatre with walls of marble . . .'[6] Again, Pliny tells us that it was of this marble that Scaurus decorated his house,[7]

[1] Brecciated grey. [2] William Hamilton, *Asia Minor*.
[3] Brussa, *op. cit.* [4] Blackish grey. [5] Corsi, *op. cit.*
[6] Pliny, *op. cit.*, Book xxxvi, chap. 8. [7] See page 6.

and bewailing the extravagance and luxury of that time, he says:—

'Can we say that there is now any thing that we have reserved for the exclusive use of the gods? However, be it so, let us admit of this indulgence for the amusements of the public; but still, why did the laws maintain their silence when the largest of these columns, pillars of Lucullan marble, as much as eight-and-thirty feet in height, were erected in the atrium of Scaurus? A thing, too, that was not done privately or in secret; for the contractor for the public sewers compelled him to give security for the possible damage that might be done in the carriage of them to the Palatium.'[1]

Other authorities than Corsi believe the Lucullan marble to be the black marble or Nero Antico from Cape Matapan, and as a proof of this hypothesis state the fact that pieces of this black marble were picked up in the villa of Lucullus;[2] however, this hardly seems sufficient evidence.

Corsi enumerates 747 columns of Bigio Antico and 389 Bigio Morato! With the exception of the granite columns, this number exceeds that of any other stone in Rome.

There are twelve columns of Bigio Antico to be seen at St. Paul's-outside-the-Walls.

Chios

Marmor Chium, Porta Santa[3]

'Variegated marbles, in my opinion, were first discovered in the quarries of Chios.'[4]

[1] Pliny, *op. cit.*, Book xxxvi, chap. 2.
[2] Ravestein Catalogue.
[3] Holy door.
[4] Pliny, Book xxxvi, chap. 5.

The island of Chios was famous from the earliest times for its marble, which Theophrastus[1] was the first to describe, and which was mentioned later by both Strabo[2] and Pliny.

The quarries on this island were worked as early as 660 B.C., and in all probability even before that date. Melas and his family, who were supposed to have been the inventors of the art of sculpture in marble, assuredly employed local material.[3]

For many years the Marmor Chium of the ancients has been supposed to be the so-called 'Africano'[4] of the Roman stone-cutter, but recent light thrown upon the subject has shown it to be the marble called Porta Santa.

We owe this discovery to Mr. Brindley, who himself has visited the island of Chios and seen the Porta Santa *in situ*. Until recent years Porta Santa has been thought a product of the island of Jasus, off the coast of Caria. This idea originated from the fact that Paulus Silentiarius described a marble coming from this island or from Caria as 'streaked with blood-red and livid white';[5] but as many variegated marbles might answer this rather vague description it is a mistake to try to fit it to any of the endless varieties of coloured marble found in Roman excavations.

The varieties of the ancient Porta Santa differ considerably in colour and stain; almost monochrome pinks and meaty-looking reds are common; there are also grey varieties both light and dark with reticular networks of yellow or red. A breccia with

[1] Theophrastus, *History of Stones* (trans. Sir John Hill).
[2] Strabo, *op. cit.*, Book xiv, chap. i. 35.
[3] L. Mitchell, *A History of Ancient Sculpture*, pp. 172 and 195.
[4] So called on account of its dark tints.
[5] P. Silentiarius, *op. cit.*

a reddish ground and grey fragments is frequently seen.

From various inscriptions we learn that Porta Santa was extensively worked during the reign of Trajan; the earliest inscription being of Nero's time. The quarries were imperial property, and the numbers on the rough blocks found in Rome mount up to 1095, showing what quantities that city disposed of.[1] It was employed in the Julian Basilica, in the Temple of Concord, and in the stadium of the Palatine.[2]

Some authorities believe Porta Santa to be the 'Claudian Stone', but this is a mistaken idea, as the stone named after that Emperor was the grey granite of Egypt, first quarried during his reign.

The door-jambs of the four great basilicas of St. Peter, St. Paul, St. John Lateran and Santa Maria Maggiore are of this marble; hence its name, Porta Santa (Holy Door).

Marmor Carystium, Marmor Euboicum, Cipollino[3]

'It (Euboea) is still better known for the marble of Carystus.'[4]

Cipollino differs from ordinary marble in showing bands (often plicated) of different shades of green, in which, according to Geikie,[5] the calcite is interleaved with scales and folia of mica and talc, with sometimes other minerals.

The name comes from *cipolla* (the Italian for onion), referring to its laminated structure, resembling that of the onion.

The Marmor Carystium of the ancients is said to

[1] Brussa, *op. cit.*
[2] Dennie, *op. cit.*
[3] Onion-like.
[4] Pliny, *op. cit.*, Book iv, chap. 21.
[5] *Textbook of Geology*, Sir Archibald Geikie.

have been the first coloured marble brought to Rome. 'According to Cornelius Nepos, the first person at Rome who covered the whole of the walls of his house with marble was Mamurra, who dwelt upon the Caelian Hill; for Nepos adds, as well, that he was the first to have all the columns of his house made of nothing but solid marble, and that, too, marble of Carystus or of Luna.'[1] Mamurra's house was built about 48 B.C. A block found in 1864 had inscribed on it the name of a consulate, which seemed to read Cecilius Rufus, year 17. If this inscription is correct, the date is the earliest found on Cipollino, or in fact on any marble.[2]

An inscription dated A.D. 73 gives us the names of two consulates under Domitian, and another under Hadrian, that of Augurinus, A.D. 132. From a third inscription of Hadrian's time we learn that a new quarry had just been opened.[2]

The numbers on rough blocks found in Rome, beginning with two, go up to 2,400! and Corsi in 1845 enumerated 511 columns!

The Temple of Faustina, of which the portico, with ten columns of cipollino (six of which form the façade), and part of the cella are still standing. It was dedicated by Antoninus, in A.D. 141 to his wife, the elder Faustina. The portico was excavated in 1807 and 1810, and the columns are 47 feet in height.[3] Some columns nearly this size were found, within recent years, on Mount Ocha (now Mount St. Elias), the ancient quarry site; and these, all but polished, were ready to take their way to the Eternal City.

This most ancient and unique marble has a white ground, banded and zoned with green of almost

[1] Pliny, *op. cit.*, Book xxxvi, chap. 7. [2] Brusza, *op. cit.*
[3] Baedeker, *Central Italy.*

every shade.[1] Sometimes the bands are almost parallel, and again they are wavy and distorted and often dislocated. It is said that because the marking of this marble resembles the waves of the sea, Agrippa, in dedicating the temple to Neptune, ornamented it with Carystian marble.

This is one of the most celebrated and most employed of all the marbles known to the ancients, and many well-known writers have referred to it, including Strabo, Papinius Statius, Pollux and Seneca.

The quarries of Carystian marbles, perhaps the largest of antiquity, were of course imperial property, and were worked by the Greeks and later by the Romans.

These ancient quarries have been rediscovered by Mr. Brindley after being lost for nearly 2,000 years. He describes them as follows:—

'After extensive search in Greece, on the island of Euboea, continued for several years over a large extent of country containing numerous quarries of inferior material, now not worth working, a series of old quarries, with beds of superior quality, have at last been found on the western coast, a little north of Carystus. The mule road from Calcis to Carystus goes through the centre of the island, passing through the villages of Stura and Kapsala, which lie in a valley. Between these villages and the sea on the western side a range of mountains rises to an altitude of 2,000 feet, running steeply down to the sea.

'One mountain still goes by the ancient name Pyrgadi, referring to the fort or outlook-tower on the summit, which commands an uninterrupted view of Stura, of the entire gulf of Petali, and west, the mainland of Attica, with the mountain range of

[1] There were also varieties stained with red, described by several writers, including Seneca and Silentiarius.

Pentelicon. Upon the sea-face of this mountain are the ancient quarries, extending from the summit to the base near the sea. The upper range of quarries is very extensive, and of great interest, showing old methods of working; columns and architraves of immense size, finished and partly worked, lying in all directions. All these were wrought engaged to the solid rock, and when roughly shaped were wedged off and finished; numerous examples of work in progress are still *in situ*. . . .

'The Pyrgadi quarries no doubt belonged to, and were worked exclusively for the state, while the lower quarries near the sea, named Duka, would appear to have been those of a private individual, and worked for lesser objects, such as pedestals and decoration, the quality being exceptionally good. The light parts are of a bluish and avanturine translucency with ivory whites, and dark banded parts of all shades of green and laky greys, curled and bent about in all directions, producing, when cut into slabs and opened out, the most charming decorative panels or dadoes for wall-surfaces.

'Roughly speaking, probably 80 per cent. of the wall and pier marble incrustation of St. Mark's, Venice, is of this Euboean marble,[1] the whole of which has been obtained by the sawing up lengthwise into slabs old columns, opened out to produce continuous patterns, chevron or otherwise, as the veinings may happen to produce; this is readily proved by examining the open vertical joints which bevel inwards.

'The narrow outer slabs of the columns were afterwards used for strip linings of the semicircular alcoves; so nothing was wasted. These marbles have always

[1] Signor Boni says that most of the incrustation is of Proconnesian.

been supposed by Mr. Ruskin and other writers to have been brought from demolished buildings of earlier date, and as regards capitals it may be correct, but when we consider that the Turks held and fortified Calcis and other places near the old quarries, and the residents to this day are not Greeks but Albanians, it is next to certain that the Turks knew of the quarries; and as only pieces remain of columns of movable size, while those of practically immovable dimensions are left intact, it seems more than probable that the bulk of the supply was unused wrought material of the late Roman Byzantine date from the quarries.

'The quarries are now being reworked, several shipments of beautiful quality having arrived in London, and some large monolithic columns are being used in the decoration of the new Roman Catholic Cathedral of Westminster.'[1]

There are other varieties of Cipollino besides the ancient, but they are all inferior in every respect. Five or six kinds are found in Italy; one of somewhat superior quality in the Rhone valley near Saillon in Switzerland, and another called Cipollino Mandolato[2] (from *mandola*, the Italian for almond, referring to the shape of its stain) in the Campan valley, Southern France.

Marmor Hymettium, Marmo Cipolla[3]

Within my dwelling you behold
Nor ivory, nor roof of gold;
Here no Hymettian rafters weigh
On columns from far Africa.[4]

The quarries of this well-known marble are in

[1] *Stone*, vol. xviii, No. 2, 1899, by W. Brindley, F.G.S.
[2] Also called 'Vert Campan'.
[3] Onion marble.
[4] Horace, Book ii, Ode 18 (trans. Sir Theodore Martin).

Mount Hymettus near Athens, and were more extensively worked by the Romans than the Greeks; partly because the bluish hue of the marble was the fashion in Rome, and partly because the quarries were nearer the sea than those of Pentelicus.

In early times Hymettian was used by the Greek sculptors, but when Parian was once known and appreciated, hardly any other marble was employed for fine pieces of work.

Strabo says that near Athens is quarried the beautiful Hymettian marble, as also the Pentelicon;[1] and Xenophon mentions that it was exported.

Pliny in speaking of the house of L. Crassus says: 'There were to be seen erected in the atrium four columns of marble from Mount Hymettus, which in his Aedileship he had ordered to be brought over for the decoration of the stage;[2] and this at a time, too, when no public buildings even as yet possessed any pillars made of that material.'[3] Valerius, who wrote about this proceeding, considered it a great sign of weakness. That Hymettian was one of the first marbles brought to Rome is proved by Pliny's narration.

This marble is known to the Roman stone-cutters as Marmo Greco Fetido (fetid Greek marble) and Marmo Cipolla (onion marble), because when sawn or rubbed it emits a fetid odour.

From an inscription we learn that the quarries of this marble were imperial property.[4] The colour is bluish white, the crystals large and brilliant, and it is nearly always banded or zoned with grey or bluish grey.

[1] Strabo, *op. cit.*, Book ix, chap. 1. 23.
[2] When in his capacity of Aedile he gave theatrical representations for the benefit of the public.
[3] Pliny, *op. cit.*, Book xvii, chap. 1. [4] Brussa, *op. cit.*

There are twenty columns of Hymettian marble at San Pietro in Vincoli and forty-two at Santa Maria Maggiore. Also the Meleager at Paris is said to be of the same material.[1]

Lapis Atracius, Lapis Thessalium, Verde Antico[2]

'It is found in the district of Atrax on level plains, not on high mountains; sometimes it is nearly green, and rather like the colour of an emerald, sometimes it approaches beautiful deep blue green.... It exhibits, in short, a combination of beauties.'[3]

Thus Paulus Silentiarius describes the Verde Antico of the ancients, which, Dr. Merrill says, is serpentine mixed with calcite or dolomite. This combination of minerals is called ophiolite, and also ophicalcite; from the Greek word *ophis*, snake, referring to the stain and colouring of the stone, which resembles the skin of a snake.

This rock is extremely interesting from a geological point of view, and appears to be a breccia of white calcite, green talc and serpentine. The ground is of every shade of green, and the fragments, which are mostly angular, are greenish black; and white calcite is conspicuous throughout the whole.

The quarries of Verde Antico are near Larissa or ancient Atrax in Thessaly, and were rediscovered some years ago by Mr. Brindley,[4] and worked again for the first time since the reign of the Emperor Justinian (A. D. 483–565). This same emperor is said to have selected columns of this stone for the decoration of St. Sophia, where Silentiarius described

[1] Ravestein Catalogue.
[2] Antique green.
[3] P. Silentiarius, *op. cit.*
[4] They were noted previously by a Venetian engineer who was planning the Thessalian railway.

the stone, and eight splendid columns in that mosque are said to have been taken from the Temple of Diana at Ephesus.[1] Columns of Verde Antico were also employed in the Erechtheum at Athens.[2]

From Mr. Brindley we learn that 'the ancient quarries of Karatchair, from which monoliths several metres in length were formerly obtained, are situated at an altitude of about 100 metres above the plain, near the village of Kassambvli in Thessaly, one and a half hour's journey from Larissa. The stone here consists of a peculiar non-stratified ophicalcite breccia, which is embedded in shales and overlaid by limestones.' The quarrying is said to be confined to the winter months, as the locality is unhealthy in the summer.

The stone was known to the Romans as Marmor Atracium or Marmor Thessalium, and was much valued, as is proved by the extensive use made of it in Rome. St. John the Lateran's is rich in this material.

Some magnificent monoliths have been quarried recently and now decorate the new Roman Catholic Cathedral of Westminster.

Marmor Lesbium, Marmo Greco Giallognolo [3]

'In making their statues these artists used the marble of Thasos also, . . . and of Lesbos, this last being rather more livid than the other.'[4]

Philostratus observes that the ancients preferred this (which among other white marbles appears dark) to any statuary marble, for sarcophagi.[5]

[1] 'Ancient Marbles,' by John D. Champlin, *Popular Science Monthly*, vol. ii, 1877.
[2] Champlin, *op. cit.*
[3] Yellowish Greek marble.
[4] Pliny, *op. cit.*, Book xxxvi, chaps. 5, 6.
[5] Corsi, *op. cit.*

Lesbian has very large and resplendent crystals. These are larger than those of any other of the ancient statuary marbles, and the marble is distinctly tinged with yellow.

Marmor Parium, Marmor Lychnite, Marmor Lygdinum,[1] *Marmor Lychnicum, Marmo Greco Duro*[2]

'In Paros is obtained the Parian marble, the best adapted for statuary work.'[3]

From the earliest times in Greece the marble from Paros and Naxos was used exclusively for sculpture; not only locally, for it was exported to great distances. 'Thus,' according to Professor Gardner, 'statues in Naxian marble have been found in places as remote from Naxos and one another as Samos, Boeotia, and Actium, and that too with differences of style such as to show that the marble must have been exported in blocks, not in finished statues. This Naxian marble is usually of coarser grain than Parian, but it is not always possible to distinguish the two, since there are quarries of coarser marble in Paros, and of finer in Naxos; in later times Naxian fell into complete disuse, but the Parian continued to be recognized as pre-eminently the sculptors' marble, especially stone of rather finer grain coming from the deep quarries of Mount Marpessa.'

According to Pliny, the marble of Paros was known as Lychnites because it was worked by lamplight in subterranean quarries; other authorities, however, say that the name was given to the marble on account

[1] Some authorities believe this to be alabaster found in the island of Paros and not the marble.
[2] Hard Greek marble.
[3] Strabo, *op. cit.*, vol. ii, Book x.

of its shining grain.[1] Pliny also relates[2] with wonder that the entrance to the labyrinth of Egypt was of this stone, as also a sepulchre found on the island of Thasos—and this last island itself was famous for its marble!

The Parian quarries passed into Roman hands about 100 B.C. They became imperial property, and one inscription records the name of a servant of Caesar's who was superintendent of the work; two others were inscribed with the name of Domitian, and one with Augurinus (A.D. 132). The numbers on various rough blocks found in Rome run up to 1,776, showing the vast quantities brought to that city.[3]

The grain of the Parian marble varies considerably, at times being exceedingly fine, and again quite coarse; but both varieties are pure white, and frequently almost translucent. The most common variety, the marble of the coarser grain, has resplendent crystals of medium size, not as large as those of Lesbian, nor yet is it as fine grained as the marble of Pentelicus or Carrara.

According to Bruzza,[4] the coarser-grained Parian, the Greco Duro[5] of the stone-cutters, was worked from the interior of the quarry, while the finer variety, or Grechetto Duro,[6] was quarried on the exterior of the mountain. An inscription of the time of Septimius Severus, dated A.D. 206, was found on a block of Grechetto Duro; and from another inscription we learn that the 'condemned' worked in these quarries under a certain Aurelius Demetrius. Bruzza states that after the quarries of Pentelicus

[1] Pliny, *op. cit.*, Book xxxvi, chap. 4.
[2] Ibid., chap. 19.
[3] Bruzza, *op. cit.* [4] Ibid.
[5] Hard Greek. [6] Small hard Greek.

had become known, Parian marble lost its value somewhat, and was employed more frequently for architectural purposes, Pentelicon being preferred by the Greek sculptors, especially the Atticans.

Robert Swan gives the following account of the Parian quarries:—

'The island of Paros is eleven miles long and eight broad at the widest part. There is a broad belt of nearly level land around the coast; but the interior is mountainous, rising to a height of 2,530 feet at Mount St. Elias (probably the ancient Mount Marpessus). The northern and western parts consist of schist, gneiss and granite, appearing also in the environs of Parekhia. The southern part of the island consists chiefly of crystalline limestone. There is no evidence here of the age of this limestone; but that of Attica is now known to be Cretaceous, and probably that of the Cyclades is of the same age. The finest statuary marble or "Lychnites" varies from 5 feet to 15 feet in thickness at the quarries of St. Minas; it occurs in a bed of coarse-grained white marble, with bluish black veins. The coarse marble becomes dark in colour near the Lychnites, both above and below it, and thus the layer of statuary marble is distinctly marked off. The dark colour is due to traces of binoxide of manganese and magnetic oxide of iron. It seems probable that the impurities have been withdrawn from the Lychnites and have become concentrated near the edges of the adjacent seams of limestone. The rocks are much disturbed and folded, and often dip at right angles. The ancients avoided the marble lying near the axis of elevation, that being of less good quality than in other parts. A Greek company formed a few years back to work the marble attacked it here, where it could be had at less expense; this discredited the

marble in the market, and the company failed, having spent over £160,000 in a railway, landing pier, and elaborate installation of various kinds.

'There is a good deal of excellent coloured marble in this island, but not having been used by the ancient Greeks this is little known.'[1]

Another authority[2] tells us that the dimensions of the various caves or chambers show the immense amount of material quarried by the ancients; in one case 25,000 cubic metres must have been taken out: this from the 'Nymph's Grotto'.

Comparatively small blocks only could be obtained, on account of the numerous fissures and faults throughout the beds, and the marble is also said to be brittle in working.

The celebrated tomb of Mausolus was of Parian marble (parts of which were coloured, some red and some blue),[3] in the building and sculpture of which Scopas, Leochares, Bryaxis, and Praxiteles collaborated. Important remains of the Mausoleum are now to be seen in the British Museum.

Herodotus tells us that the Prytaneum of the Siphnians was ornamented with Parian.[4] The famous Venus de' Medici, and the Pallas of Velletri are of this material; as also the Capitoline Venus according to Signor Boni; and, as a last example, may be mentioned the celebrated Parian Chronicles now in Oxford.

[1] From *British Association Reports*, Sect. G, Newcastle Meeting, September, 1887.
[2] 'Marbles of Greece,' by A. Cordella, *Stone*, vol. xxiv, 1902.
[3] *Marble and Marble Workers*, by Arthur Lee.
[4] Herodotus, *op. cit.*, Book iii. 57.

Marmor Pentelicum, Marmo Greco Fino [1]

'Wonderful to see, though not impressive to hear of, is a stadium of white marble. One may best get an idea of its size as follows. It is a hill rising above the Ilissus, of a crescent shape in its upper part, and extending thence in a double straight line to the bank of the river. It was built by the Athenian Herodes, and the greater part of the Pentelic quarries was used up in its construction.' [2]

Thus Pausanias describes one of Herodes' constructions in Pentelic marble, the quarries of which were at one time his property, and did not belong to the state, like those of nearly all the other most celebrated marbles.

Pentelic marble is exceedingly fine-grained and smooth, and cannot possibly be mistaken for Parian, as its crystals are minute and tiny brown specks are not infrequently noticed on its surface. It resembles the Carrara statuary marble, but is of an even purer white.

This marble was used at a very early period by the Greeks, and later to some extent by the Romans, although it is rather scarce in Rome, and Pliny entirely omits any account of it.

In one of his letters to Atticus, Cicero writes in a very different tone from that of his Verrine orations.[3] 'I have paid L. Cincius the 20,400 sesterces for the Megaric statues in accordance with your letter to me. As to your Hermae of Pentelic marble with bronze heads, about which you wrote to me—I have fallen in love with them on the spot. So pray send

[1] Fine Greek marble.
[2] Pausanias, *op. cit.*, Attica, Book i. 19. 6.
[3] See page 4.

both them and the statues, and anything else that may appear to you to suit the place you wot of, my passion, and your taste—as large a supply and as early as possible. Above all, anything you think appropriate to a gymnasium and terrace.

'I have such a passion for things of this sort that while I expect assistance from you, I must expect something like rebuke from others. If Lentulus has no vessel there, put them on board any one you please.'[1]

Pausanias describes numbers of statues, tombs and buildings of Pentelic marble. In one instance he says, 'Moreover, a little way from the sanctuary (at Scillus) a tomb was shown, with a statue of Pentelic marble on the grave. The neighbours say it is the tomb of Xenophon.'[2]

The greatest of Greek sculptors, for example, Scopas and Praxiteles, made use of this marble, and Plutarch (*Publicola*, 17) says that the columns of the Temple of Jupiter Capitolinus, rebuilt for the fourth time by Domitian, were of this material. He adds that he had seen them at Athens, and their height and diameter were in exact proportion, but at Rome they had been re-cut and polished, and had lost all their beauty and symmetry.[3]

The Parthenon at Athens was constructed of Pentelic marble, and Arthur Lee says: 'There are now standing at the entrance six columns with gateways between them, built of three or four stones, but no separation has been observed, although they have been exposed to weathering for more than two thousand years.'[4] The Elgin Marbles, those im-

[1] *Letters of Cicero* (trans. Evelyn S. Shuckburgh).
[2] Pausanias, *op. cit.*, Book v, Elis 1.
[3] Ravestein Catalogue.
[4] Arthur Lee, *Marble and Marble Workers.*

portant remains of the Parthenon in the British Museum, are, of course, of the same stone.

The Erechtheum and the Propylaea at Athens were both constructed of Pentelic marble, and the three columns of the Temple of Castor and Pollux, and Pallas of the Villa Albani are also famous examples of this stone.

The quarries, worked as early as 500 B. C., or perhaps before, are still worked in a small way, and supply modern Athens and Piraeus with about 2,500–3,000 cubic metres a year.[1] 'The ancient quarries are in the south-western portion of the Pentelicon district, containing snow-white to milk-white stone. That in the caverns contains fine embedded particles of mica, and is unsuitable for structure exposed to weather. It was from these ancient quarries that the Romans and Greeks obtained their marble; the latter even preferring this to Parian, as it could be had within eight miles of Athens, was finer, whiter and less translucid than that stone. Pentelic sometimes presents greenish talc zones. The material for the new palace for King Otho, erected in 1835, was derived from the ancient quarries. The modern quarries, which supply modern Athens and Piraeus, are at Kakkinaras, to the east of Kephusia, and contain the so-called "upper marble", which is bluish grey in colour (called Melana, ink marble) and frequently grey streaked; and the "under marble", separated from the upper by micaceous shale and forming a bed of white marble 500 metres thick.'[2]

Pentelic marble on being exposed mellows, and becomes slightly tinged with yellow. This gives rise to the 'patina' of many well-known statues; for example, the Elgin Marbles.

[1] *Stone*, vol. xxiv, Nos. 1 and 5, 1902.
[2] Ibid.

Marmor Proconnesium, Marmor Cyzicum, Bianco e Nero Antico [1]

Vitruvius says: 'In the house of Mausolus, a very powerful king of Halicarnassus, though all the ornaments are of Proconnesian marble, the walls are of brick.' [2] This proves to us that the marble was known and employed as early as the fourth century B. C., if not before.

Pliny [3] and Salmasius both mention this marble, the quarries of which were on the island of Proconnesus, later called Marmora, on account of its product; and the Propontis became known as the Sea of Marmora.[4]

The marble was also called Cyzican, because it was so extensively employed in the town of Cyzicus; as also in Constantinople, where it was especially valued and used during the reigns of Honorius and the younger Theodosius. There are several columns of it in the mosque of St. Sophia, which are the spoils of the Temple of Cybele at Cyzicus,[5] and Silentiarius, in describing the marbles of that mosque, says: 'The Proconnesian mountain which paves the whole wide floor lovingly lays down its back as a pathway for the foot of the beneficent Imperial City.' [6]

In ancient times Proconnesian marble was sent to Greece in large quantities to be employed for sarcophagi. At the present day the quarries supply Constantinople with slabs and blocks for the pavement of mosques and baths, and for tombstones.[7]

Some varieties of the marble are coarse and greyish, others white, and white with greyish stripes.

[1] Antique black and white.
[2] Vitruvius, Book ii (trans. Joseph Gwilt).
[3] Pliny, *op. cit.*, Book v. 44. [4] Champlin, *op. cit.*
[5] Ibid. [6] Paulus Silentiarius, *op. cit.*
[7] R. Walpole, *European and Asiatic Turkey.*

According to Spratt, the Proconnesian quarries are as extensive as those of Pentelicus in Attica, while the marble in some parts is quite as white, pure and crystalline as that of Paros, but generally resembles more closely the Cipollino of Carystus.[1]

Proconnesian marble was not used to any great extent by the Romans, but it was frequently employed in Ravenna where, in the Basilica of St. Ursula, and in the church of St. Apollonius, there are a number of columns of it to be seen.[2]

Marmor Scyrium, Sette Basi[3]

'There are quarries of variegated marble called Scyrian; in appearance it resembles that marble which is described as variegated Lydian,[4] a variegated stone.' (Eustatius to Dionisius Periegetes.)[5]

Statius calls the island of Skyros 'lapidosa', and Strabo says: 'There may be seen at Rome columns consisting of a single stone, and large slabs of variegated marble (from Skyros) with which the city is embellished, both at the public charge and at the expense of individuals.'[6] Strabo adds that on account of this introduction of coloured marble the price of white marble had fallen.

This stone, known in Rome as Sette Basi, for the reason that it was first found in the ruins of the Villa of Septimius Bassus, and the breccia called Semesanto[7] came from the quarries on the island of Skyros.

[1] *Quarterly Journal, Geol. Soc. of London*, vol. xiv, 1858.
[2] Ravestein Catalogue.
[3] Septimius Bassus.
[4] See page 98.
[5] Bruzza, *op. cit.*
[6] Strabo, *op. cit.*, Book ix, chap. v. 16.
[7] From resemblance of its fragments to semesanto—coloured sugar plums containing physics, and given to children. Pullen

A block of Setti Basi was found in the Roman Emporium with the letters S C Y R[1] inscribed upon it, and the name of Valentis, who was procurator of the quarries, which were small and imperial property. At another time these were under the care of the centurion Sergius; for a block is inscribed 'Sub cura Sergi Leg. XV'. This must have been shortly before A. D. 69, that is, during the reign of Nero.[1] Bruzza also tells us that blocks of this marble found in the Roman Emporium are all in the lower part, where the more ancient marbles are unearthed, and near blocks of Africano, which was also in vogue in Nero's time.

'In the year 1897 a British company (Marmor Ltd.) started in Greece for the working of marble quarries, and made a contract with the municipality of Skyros to obtain the exclusive right to extract marble for fifty years. They began work in 1899, and at the end of 1901 the amount of extraction amounted to 1,351 cubic metres from old Roman quarries with which the island is honeycombed. This marble, which is perhaps as valuable as the Verde Antico of Thessaly, is found in layers in the mountains far from the sea. At intervals of ten to fifteen miles white patches appear, and the good marble of the deep red pigeon-blood colour is taken from between the two veins of white. It is proposed to work these quarries after the manner of coal mining by following the strata underground.'[2]

There are many varieties of Skyrian marble, including white and red, white and yellow, white and purple, and all four colours combined. These are

suggests that the word may possibly have been derived from Semo Sancus, a Sabine divinity, to whom statues may have been raised in this material.

[1] Bruzza, *op. cit.* [2] *Stone*, vol. xxiv, No. 5, 1902.

breccias, brecciated and veined. The colours are clear and beautiful, and the marble is fine-grained and most attractive. Unfortunately it is very brittle; thus the expense in extraction is great, and it is difficult to obtain it in large blocks. The Romans were certainly justly appreciative of this marble, of which quantities may be seen in Rome to-day.[1]

Lapis Lacedaemonius, Lapis Spartanus, Lapis Taygetus, Lapis Croceus, Serpentino Verde Antico [2]

'. . . Certain persons, assisted by the wealth of the Romans, lately opened a large quarry in Taygetum.'[3]

This stone, known to the Roman stone-cutter as Serpentino Verde Antico, is an igneous rock, a diabase consisting of large greenish crystals of labradorite embedded in a fine compact ground-mass of the same felspar, together with augite and titaniferous iron.[4] The ground is of a deep beautiful green, and the crystals, averaging about three-eighths of an inch long, are oblongs, and star-shaped, or crosses. These are of a much lighter green and sometimes yellow or brown.

Pliny, in speaking of various stones, says: 'They are not all of them produced from quarries, but in many instances lie scattered just beneath the surface of the earth; some of them, the most precious even, the green Lacedaemonium marble for example, more brilliant in colour than any other.'[5]

Pausanias says: 'Going down to the sea in the direction of Gythium, we come to the Lacedaemonian village of Croceae. The stone quarry is not one continuous mass of rock, but the stones are dug

[1] The Capitoline Museum possesses good examples.
[2] Antique green serpentine.
[3] Strabo, *op. cit.*, Book viii, chap. 5.
[4] Delesse, *op. cit.*
[5] Pliny, *op. cit.*, Book xxxvi, chap. 11.

out in the shape of pebbles. They are hard to work, but once worked they might grace sanctuaries of the gods, and they are especially fitted to adorn swimming-baths and fountains.'[1]

Lampridius relates that Heliogabalus paved the courts of the Palace on the Palatine with stones of Lacedaemon and porphyry;[2] this particular mode of decoration of the luxurious Romans causes Seneca to say, 'Not contented with having riches, they trod them under foot,' and Statius declares, 'I trod regardless on a mass of wealth.' Quantities of this stone were cut up for making pavements and mosaics, and it was used most frequently in combination with the ancient red 'porphyry', and called Opus Alexandrium.

Serpentino Verde Antico was known to the Romans as Lapis Lacedaemonius because it was found in Lacedaemon; also as Lapis Taygetus because it was quarried from that mountain; as Lapis Croceus, from Croceae, a town near Mount Taygetus, and finally as Lapis Spartanus, Croceae being near Sparta. Procopius called the stone Lapis Smaragdinus on account of its green colour.

'At Levetsova, near the ancient Krakeae (or Croceae), between Sparta and Gythium, are old quarries of Labrador Porphyrite, dense olive-green masses of felsite with crystals of felspar, forming lode-like masses in micaceous shale.'[3] The French rediscovered these ancient quarries, which were worked both by the Greeks and Romans. The stone is extremely hard, and obtainable only in pieces of small dimensions, being employed almost entirely for pavements and inlaid work. Eurycles, the Spartan architect, is said to have used it in the decoration of the Baths of

[1] Pausanias, *op. cit.*, Book iii. 21. 4.
[2] Ravestein Catalogue.
[3] *Stone*, vol. xxiv, No. 1, 1902.

Neptune at Corinth, and Silentiarius described it in the mosque of Saint Sophia: 'Here also you may see the green brightness of Laconian stone.'[1]

Mr. Brindley says the stone also came from Egypt, and in fact there are several objects of it in the Fourth Egyptian Room of the British Museum. A similar stone is found at Lambay Island, Dublin Bay, in the United States, and in New South Wales. These stones are most unusual in appearance and extremely attractive, but on account of the difficulty in working them, and the fact that they can only be obtained in small pieces, they are barred from the list of the ornamental and decorative stones employed in present times.

Marmor Taenarium, Nero Antico,[2] *Rosso Antico*[3]

'Laconia contains also quarries of valuable marble. Those of the Taenarian marble in Taenarum are ancient.'[4]

The handsome red and black marbles from the Cape Matapan peninsula (ancient Taenaron) were evidently much desired by the ancients, and considered of great value, as Tibullus says: 'What need have I of a palace supported by columns from Phrygia, Tenaris, or Carystus?'[5] And Propertius: 'My house, it is true, does not lean on columns of marble from Tenaris.'

The ancient quarries of Rosso Antico have been reopened[6] within the last few years at Hagios Ilias and at Kastri (province of Mani, southern part of Laconia), but at the latter place the quality is inferior.

[1] P. Silentiarius, *op. cit.* [2] Antique black.
[3] Antique red. [4] Strabo, *op. cit.*, Book viii, chap. 5.
[5] Tibullus, Book iii, Elegy iii (Bohn).
[6] According to Mr. Brindley.

A handsome red marble is also quarried at Taenaron and Kisternae, which furnished the blocks for the memorial erected in England to Lord Byron.

A marble closely resembling the Rosso Antico of the ancients is found near Oran in Algeria, and a so-called 'Rouge Antique' at Villerembert and Cierp, France, which is used to some extent. The Roman stone-cutter of to-day imitates Rosso Antico so well in coloured terracotta that it is often difficult at first sight to distinguish between the two.[1]

There are two fine columns of this marble, which is of a rich monochrome red and fine texture, in the Rospigliosi Palace in Rome.

The Nero Antico or ancient black marble was also found on the promontory of Taenaron in Laconia, and is supposed by one authority[2] to have been the celebrated Lucullan marble. The same author says that quarries of a beautiful black stone have been found at Theux (near Spa), which have been abandoned for centuries, and were worked by the ancients; perhaps by one of the lieutenants of Mamurra, the prefect of works of Caesar in the Gauls. Important traces of Roman occupation, including a number of inscriptions, have been found at Juslenville (Theux).

Nero Antico is of a deep black colour, and is fine-grained, taking a good polish. An urn of it may be seen on the high altar of the Church of S. Marcello, Rome.

Signor Boni also discovered a fine pavement of handsome black marble of the time of the Gracchi in the Roman Forum.

[1] Ravestein Catalogue. [2] Ibid. See also page 70.

STONE FROM NUBIA

Lapis Basanites, Lapis Aethiopicus, Basalt, Basalte

'THIS king (Mykerinos) also left behind him a pyramid, much smaller than that of his father, of a square shape and measuring on each side three hundred feet lacking twenty, built moreover of Ethiopian stone up to half the height.'[1]

Basalt is a volcanic rock, compact, very hard and dark in colour, usually of black, brownish or greenish shades. It consists chiefly of felspar and augite, or some other mineral of the pyroxene group. The name is said to have been derived from the Ethiopian word *basal*, for iron, which it resembles in hardness. This stone, used by the Egyptians and later by the Romans, was procured from Ethiopia, and Pliny gives the following account of it: 'The Egyptians have discovered in Ethiopia the stone known as "Basanites", which in colour and hardness resembles iron, whence the name that has been given to it. A larger block of it has never been known than the one forming the group which has been dedicated by the Emperor Vespasian Augustus in the Temple of Peace. It represents the river Nilus with sixteen children sporting around it, symbolical of the sixteen cubits, the extreme height to which, in the most favourable seasons, that river should rise. It is stated too, that in the Temple of Serapis at Thebes there is a block not unlike it, which forms the statue

[1] Herodotus, Book ii. 134 (trans. G. C. Macaulay).

of Memnon there; remarkable, it is said, for emitting a sound each morning.'[1]

According to King[2] this was probably a work of the age of the Ptolemies, and brought from Alexandria by the emperor named as its dedicator. This, however, is not the group in the Vatican which passes for it, the latter being in statuary marble. King adds that 'the Capitoline Museum possesses some wonderful centaurs and stags in basalt, ascribed to the reign of Hadrian, of whom Pausanias had noted as something remarkable, a statue in this material, "Egyptian stone," in the Olympeum, Athens. His love of Egyptian art revived the use of this stone, which the Egyptians continued to sculpture to a late period of the Roman Empire. The more compact pieces of this extremely hard material were used for scarabi and intagli by the later Egyptians: it is not unusual to find gnostic amulets, belonging to the Alexandrian sects, engraved in basalt. Engravers, however, of a good period have never made use of so coarse a material.'

Strabo mentions a similar stone to Lapis Basanites found near Syene.

The urn on the high altar of the Church of S. Croce in Gerusalemme is of the ancient basalt.

[1] Pliny, *op. cit.*, Book xxxvi, chap. 11. [2] King, *op. cit.*

STONE FROM SPAIN

Marmor Schiston, Broccatello

From Tortosa in Spain came the Marmor Schiston of the ancients, a richly-coloured fossiliferous marble. In colour it is a mixture of deep yellows and dull reds and purples, with innumerable fossils of a pale translucent brownish tint. The dull reds, yellows and purples vary to a great extent in depth of colour; sometimes they are pale and washed out, and again deep and clear; while the reddish purple colouring of the ground is predominant.

Dioscorides, who mentions this marble, asserts that it came from Spain, and compares its colour to that of saffron. St. Isidore of Seville also refers to it.[1]

Marmor Schiston is known to the Italian stone-cutter as Broccatello, from the Italian *broccato*, ancient gold cloth or brocade, referring to its rich colouring and marking.

Broccatello was not only largely used in Rome but also in Naples, whither it was brought in larger quantities by the Spanish viceroys.

The marble is to be seen in Santa Maria Maggiore and Santa Cecilia in Rome, and is still quarried near Tortosa.

[1] Corsi, *op. cit.*

STONE FROM TURKEY IN EUROPE

Marmor Molossium, Fior di Persico [1]

'NOWHERE outside of Molossia or Epirus does any man fell in the forest columns like these, so tall, so graceful, and bright with all the colours of a flower garden.' [2]

Thus Paulus Silentiarius appropriately describes the colouring of this marble, which indeed has a flower-like appearance. The stains are of almost every shade of pink, lilac, purple and red confused together on a white ground-mass.

This stone, known to the Romans as Marmor Molossium, was also considerably employed in Constantinople; where, in the mosque of Saint Sophia, Silentiarius made his observation.

The quarries were situated in the district inhabited by the Molossians, that ancient tribe of Epirus famous for its shepherd-dogs. Here, near the source of the famous river Acheron, the Romans obtained this highly prized marble, used so frequently in the decoration of their city, two columns of which are to be seen to-day in the Church of Sant' Antonio de' Portoghesi.

Mr. Brindley discovered a quarry of Fior di Persico on the island of Elba, and inferior kinds are found in other parts of Europe—but none of these can compare with the ancient. One variety is found in Maine-et-Loire, France, and known as Fleur de Pêcher; and another effective marble is quarried in the province of Massa e Carrara.

[1] Peach-blossom. [2] P. Silentiarius, *op. cit.*

STONE FROM TURKEY IN ASIA

Marmor Lydium, Rosso Brecciato [1]

EUSTATIUS in mentioning Skyrian marble says: 'In appearance it resembles that marble which is described as "Variegated Lydian", a variegated stone,' [2] and Paulus Silentiarius in describing the marbles in Saint Sophia says: 'And there are all those that are rolled down the Lydian mountain gorge, glowing with pale white and red.' [3] The ground is of a dark rich red, and it is brecciated with white and veined almost imperceptibly with black.

There are two columns of this marble to be seen in the Church of San Luigi at Rome.

There is another well-known ancient marble, which must be mentioned, from Aleppo in Turkey, and which Bomare describes as composed of fragments of grey, reddish brown, black and yellow, the last colour predominating.[4] This marble is a breccia containing large fragments of clear grey, cemented by a reddish paste, in which are also small grey fragments; the whole is sparingly stained with a yellow resembling that of the yolk of an egg in its purity and depth of colour.

There is a fragment of a column of this Breccia di Aleppo in the Galleria de' Candelabri of the Vatican Museum.

[1] Brecciated red.
[2] Bruzza, *op. cit.*
[3] Silentiarius, *op. cit.*
[4] Bomare, *Dictionnaire Raisonné d'Histoire Naturelle.*

A marble slightly resembling this, but inferior, is found in France, and known as Brêche d'Aleps.

Marmor Phrygium, Marmor Synnadicum, Marmor Docimenium, Marmo Pavonazzetto [1]

'Synnada is not a large city. In front of it is a plain planted with olives, about sixty stadia in extent. Beyond is Docimia, a village, and the quarry of Synnadic marble. This is the name given it by the Romans, but the people of the country call it Docimite and Docimaean. At first the quarry produced small masses, but at present, through the extravagance of the Romans, pillars are obtained consisting of a single stone, and of great size, approaching the Alabastrite marble in variety of colours. Although the distant carriage of such heavy loads to the sea is difficult, yet both pillars and slabs of surprising magnitude and beauty are conveyed to Rome.' [2]

Thus Strabo speaks of the famous Phrygian marble, the colour of which was compared by the poets to the blood of Atys slain at Synnada, from which, according to the legend, violets sprang.

The allusions in the classics to this marble are innumerable, so great was its fame and value. Lucian in speaking of a certain bath says: 'On every side are doors of polished Phrygian marble.' [3] Tibullus, Martial, Horace, Juvenal and Pliny all refer to the stone. The latter, in speaking of magnificent constructions, mentions the Basilica of Paulus with its 'admirable Phrygian columns'.[4]

[1] From *pavone*, peacock—referring to the colour of the marble.
[2] Strabo, *op. cit.*, Book xii. [3] Ravestein Catalogue.
[4] Pliny, *op. cit.*, Book xxxvi, chap. 24.

The quarries at Synnada were at first only few, but were rapidly developed in the time of Augustus, when neither trouble nor expense were considered; and in spite of the fact that every block or column had to be carried over 100 miles before shipment to Rome, vast quantities of the stone were sent to that city.

This marble was the principal source of trade and renown to the citizens of Synnada and Docimium, who even boasted of it on their coins.[1]

The earliest instance we know of Synnadian marble being brought to Rome is that of the columns of the Basilica Emilia, erected in 179 B.C. Of the date of Augustus are the columns of the interior of the Pantheon, and a block bearing the name of Agrippa which was found in Ficoroni's time under the Piazza di San Luigi de' Francesi.[1]

An inscription was found at Docimium with the names of Sura III and Palma II, of the time of Trajan. Of Hadrian's reign is a block found in the Emporium, bearing the name of the Consul Augurinus, A.D. 132; two columns discovered near the Marmorata in 1842 with the names of Helius Caesar and of Balbinus, Consuls in A.D. 137; on one of these was a lead medal, now in the Museo Kircheriano, with the effigy of the Emperor.[1]

Pavonazzetto was employed in the Julian Basilica, in Trajan's Temple, in Caracalla's Baths, and in numerous other edifices of Rome.

It makes it easier for us to realize the vast quantities taken from the Synnadian quarries during these years when we read the words of Pausanius: 'Hadrian also built for the Athenians a temple of Hercules and Panhellenian Zeus, and a sanctuary common to all

[1] Brussa, *op. cit.*

the gods. But most splendid of all are one hundred columns; walls and colonnades alike are made of Phrygian marble.'[1] From the inscription on the Gymnasium of Smyrna we learn that besides the large numbers of other precious marbles, Hadrian gave eight hundred and two columns of Synnadian.[2]

It was evidently a favourite marble of this Emperor's, who also employed it in the ornamentation of his own mausoleum. Blocks bearing the dates A.D. 150 and 161 have been found, and the quarries remained open for a long period following this time. Under Constantine this, with other marbles, abandoned the road to Rome for that of Constantinople, and was employed to decorate the new seat of the Empire.

Silentiarius, in describing the marbles of Saint Sophia, says: 'But what man is there filled with the ringing poetry of Homer to celebrate fitly the fields of marble collected around the huge walls of the lofty Temple and the broad pavement? Where the steel of the lapidary's graver has carved the green surfaces of Carystian and has incised the blue of the Phrygian variegated marble . . . the latter glows softly with a lustre at once pure purple and silvery.'[3]

Hamilton, who visited the quarries in 1835, describes them as follows: 'The Synnadian quarries are near Eski-Kara-Hissar. Before reaching them their existence was pointed out by a hundred little mounds or monticules of chippings from the extracted blocks, as well as surrounding the entrance to the principal open quarry. This has been worked horizontally into the hill, the sides of which are cut away perpendicularly to a very great height, for those splendid columns which were to gratify the

[1] Pausanias, *op. cit.*, *Attica*, Book 1. [2] Bruzza, *op. cit.*
[3] P. Silentiarius, *op. cit.*

pride of the rulers of the world. The marble is highly crystalline, and occurs in the following colours: white, bluish white, white with yellow veins, white with blue veins, and white with blue spots, having almost a brecciated appearance. All traces of stratification are obliterated, but in a few cavities are some fine specimens of concentric crystalline calc-spar. Exploring the hills beyond I found several more quarries, but all worked downwards from the top, not from the side of the hill like the one to which my guide had led me. As far as I could ascertain, this mass of marble was entirely surrounded by trachytic hills, to which it owes its crystalline and altered characters.'[1]

[1] Hamilton, *op. cit.*

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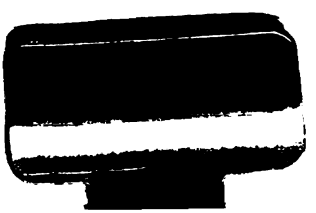

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